

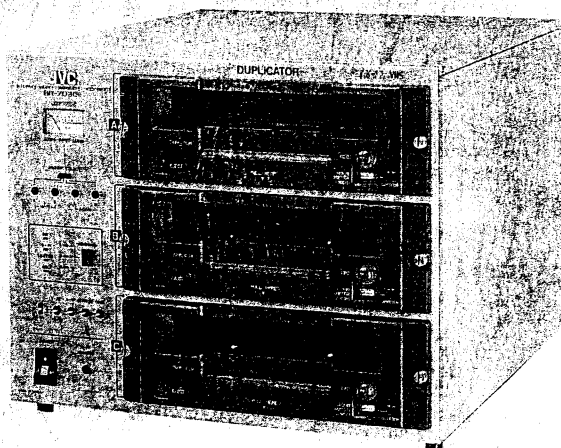
# JVC

## SERVICE MANUAL

### VIDEO CASSETTE RECORDER

VHS Hi-Fi DUPLICATOR

## BR-7030E



### SPECIFICATIONS

#### GENERAL

Format	: VHS (standard recording)
Tape width	: 12.65 mm (1/2 inch)
Tape speed	: 23.39 mm/s (SP mode)
Recording time	: 180 minutes with E-180 cassette
Fast forward/Rewind time	: 4.5 min. for 180 min. tape
Operating temperature	: 5°C to 40°C
Storage temperature	: -20°C to 60°C
Ambient humidity	: 30 % to 80 %
Power consumption	: Approx. 64 watts
Power requirement	: AC 220 V/240 V~, 50/60 Hz
Dimensions	: 430 mm(W) x 345 mm(H) x 485 mm(D)
Weight	: Approx. 30 kg

#### VIDEO (REFERENCE SPECIFICATIONS)

Recording system	: Rotary two-head, helical scanning system Luminance: FM recording Colour: Down-converted direct recording
Video signal system	: PAL-type colour signal
Input level (line)	: 0.5 ~ 2.0 Vp-p, 75 ohms, unbalanced
Signal-to-noise ratio	: 43 dB (Colour)
Horizontal resolution	: 240 lines (Colour)

#### AUDIO (REFERENCE SPECIFICATIONS)

Input level (line)	: -6 dBs, 10 k-ohms, (balanced/Hi-Fi, unbalanced/Normal)
Signal-to-noise ratio	: 46 dB (NR-on, at 3 % distortion) 42 dB (NR-off, at 3 % distortion)
Frequency response	: 20 to 20,000 Hz (Hi-Fi) 40 to 12,000 Hz (Normal)
Wow and flutter (Self-recording & PB)	: Less than 0.006% wrms (Hi-Fi) Less than 0.2% wrms (Normal)
Dynamic range	: 87 dB (Hi-Fi)

\*VIDEO & AUDIO SPECIFICATIONS ARE BASED ON PLAYING BACK BY STANDARD PLAYER/RECORDER.  
\*DESIGN AND SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

# INVOICE

# JVC

## VICTOR COMPANY OF JAPAN, LIMITED

HEAD OFFICE: INTERNATIONAL MARKETING DIVISION  
8-14, NIHONBASHI-HONCHO 4-CHOME,  
CHUO-KU. TOKYO. 103. JAPAN

For Account and Risk of Messrs:		Case Mark:	Invoice No.:
Consigned to Messrs: JVC DEUTCHLAND GMBH JVC HAUS MERGENTHALER ALLEE 31-33, 6236 ESCHBORN, F.R. GERMANY TEL: 49-6196-4960 MR. TOMOHARA			Date: 24. JULY. 1989.
			Order No.:
Shipped per AIR PARCEL  from TOKYO to FRANKFURT via		ADDRESS	Payment:

MODEL NO.	DESCRIPTION	QUANTITY	UNIT PRICE	TOTAL AMOUNT
	SERVICE MANUAL NO:9188 BR-7030E	1 VOL	2,000.	F.O.B. JAPAN ¥ 2,000.
COUNTRY OF ORIGIN : JAPAN FREIGHT :PREPAID 1 CARTONS ONLY  NO COMMERCIAL VALUE, VALUE FOR CUSTOMS PURPOSE ONLY.		TOTAL	1 VOL	¥ 2,000.
		VICTOR COMPANY OF JAPAN, LIMITED QUALITY ASSURANCE SECTION VIDEO COMMUNICATIONS DIVISION YOKOHAMA PLANT 3-12 Moriya-cho, Kanagawa-ku Yokohama, Kanagawa 221, JAPAN TOMOTADA ENAMI/MANAGER Phone : 045-453-1111		



# ERRATA

I t e m	F a u l t	C o r r e c t
Page 3-2 2.Drum FG/PG	Description 2) C = more than 0.5V	C = less than 0.5V
Page 3-3 5.PB SW point	Description L.20 back a tape recorded by BR-7030U,	back a tape recorded by BR-7030E,
Page 3-5 1.N.audio E-E level	Description 2) TP3(TP4) of CN11 becomes	TP3(TP4) becomes
Page 3-5 2.Limiter	Check Point CN11  Description 2) pin1(pin4) of CN11	TP3(L-ch) TP4(R-ch)  TP3(TP4)
Page 4-18 4.15 REAR-1 Address 5B,4B and 3C	C8 1/50 C9 1/50 C10 47/50 C11 47/50	C8 1000P C9 1000P C10 0.047 C11 0.047
Page 4-32 WAVEFORMS W7	30Hz	25Hz
Page 4-34 WAVEFORMS W3	30Hz	25Hz
Page 4-35 WAVEFORMS W1,W4 and W6	30Hz	25Hz
Page 4-41 4.40 ID CODE Address 1C	R29 1k R30 10k	R29 10k R30 1k

## Important Safety Precautions

Prior to shipment from the factory, JVC products are strictly inspected to conform with the recognized product safety and electrical codes of the countries in which they are to be sold. However, in order to maintain such compliance, it is equally important to implement the following precautions when a set is being serviced.

### ●Precautions during Servicing

1. Locations requiring special caution are denoted by labels and inscriptions on the cabinet, chassis and certain parts of the product. When performing service, be sure to read and comply with these and other cautionary notices appearing in the operation and service manuals.

2. Parts identified by the  $\Delta$  symbol and shaded (■) parts are critical for safety.  
Replace only with specified part numbers.

Note: Parts in this category also include those specified to comply with X-ray emission standards for products using cathode ray tubes and those specified for compliance with various regulations regarding spurious radiation emission.

3. Fuse replacement caution notice.  
Caution for continued protection against fire hazard.  
Replace only with same type and rated fuse(s) as specified.

4. Use specified internal wiring. Note especially:  
1) Wires covered with PVC tubing  
2) Double insulated wires  
3) High voltage leads

5. Use specified insulating materials for hazardous live parts. Note especially:  
1) Insulation Tape 3) Spacers 5) Barrier  
2) PVC tubing 4) Insulation sheets for transistors

6. When replacing AC primary side components (transformers, power cords, noise blocking capacitors, etc.) wrap ends of wires securely about the terminals before soldering.

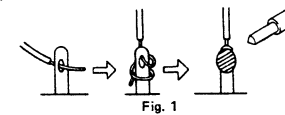


Fig. 1

7. Observe that wires do not contact heat producing parts (heat-sinks, oxide metal film resistors, fusible resistors, etc.)

8. Check that replaced wires do not contact sharp edged or pointed parts.

9. When a power cord has been replaced, check that 10—15 kg of force in any direction will not loosen it.

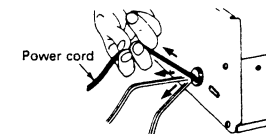


Fig. 2

10. Also check areas surrounding repaired locations.

11. Products using cathode ray tubes (CRTs)  
In regard to such products, the cathode ray tubes themselves, the high voltage circuits, and related circuits are specified for compliance with recognized codes pertaining to X-ray emission. Consequently, when servicing these products, replace the cathode ray tubes and other parts with only the specified parts. Under no circumstances attempt to modify these circuits. Unauthorized modification can increase the high voltage value and cause X-ray emission from the cathode ray tube.

### 12. Crimp type wire connector

In such cases as when replacing the power transformer in sets where the connections between the power cord and power transformer primary lead wires are performed using crimp type connectors, if replacing the connectors is unavoidable, in order to prevent safety hazards, perform carefully and precisely according to the following steps.

1) Connector part number : E03830-001

2) Required tool : Connector crimping tool of the proper type which will not damage insulated parts.

3) Replacement procedure

(1) Remove the old connector by cutting the wires at a point close to the connector.

Important : Do not reuse a connector (discard it).



Fig. 3

(2) Strip about 15 mm of the insulation from the ends of the wires. If the wires are stranded, twist the strands to avoid frayed conductors.

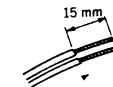


Fig. 4

(3) Align the lengths of the wires to be connected. Insert the wires fully into the connector.

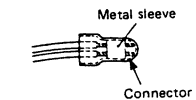


Fig. 5

(4) As shown in Fig. 6, use the crimping tool to crimp the metal sleeve at the center position. Be sure to crimp fully to the complete closure of the tool.

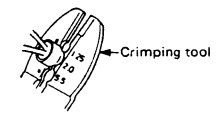


Fig. 6

(5) Check the four points noted in Fig. 7.

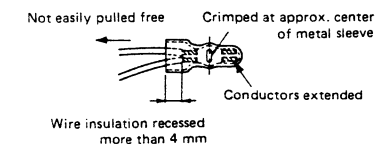


Fig. 7

## ● Safety Check after Servicing

Examine the area surrounding the repaired location for damage or deterioration. Observe that screws, parts and wires have been returned to original positions. Afterwards, perform the following tests and confirm the specified values in order to verify compliance with safety standards.

### 1. Insulation resistance test

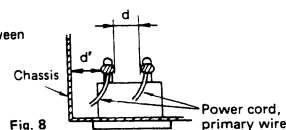
Confirm the specified insulation resistance or greater between power cord plug prongs and externally exposed parts of the set (RF terminals, antenna terminals, video and audio input and output terminals, microphone jacks, earphone jacks, etc.). See table 1 below.

### 2. Dielectric strength test

Confirm specified dielectric strength or greater between power cord plug prongs and exposed accessible parts of the set (RF terminals, antenna terminals, video and audio input and output terminals, microphone jacks, earphone jacks, etc.). See table 1 below.

### 3. Clearance distance

When replacing primary circuit components, confirm specified clearance distance (d), (d') between soldered terminals, and between terminals and surrounding metallic parts. See table 1 below.

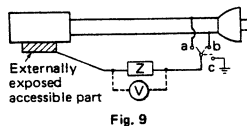


### 4. Leakage current test

Confirm specified or lower leakage current between earth ground/power cord plug prongs and externally exposed accessible parts (RF terminals, antenna terminals, video and audio input and output terminals, microphone jacks, earphone jacks, etc.).

**Measuring Method:** (Power ON)

Insert load Z between earth ground/power cord plug prongs and externally exposed accessible parts. Use an AC voltmeter to measure across both terminals of load Z. See figure 9 and following table 2.

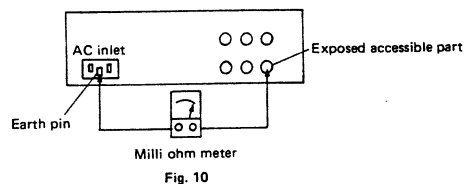


### 5. Grounding (Class I model only)

Confirm specified or lower grounding impedance between earth pin in AC inlet and externally exposed accessible parts (Video in, Video out, Audio in, Audio out or Fixing screw etc.).

**Measuring Method:**

Connect milli ohm meter between earth pin in AC inlet and exposed accessible parts. See figure 10 and grounding specifications.



Grounding Specifications

Region	Grounding Impedance (Z)
USA & Canada	$Z \leq 0.1 \text{ ohm}$
Europe & Australia	$Z \leq 0.5 \text{ ohm}$

AC Line Voltage	Region	Insulation Resistance (R)	Dielectric Strength	Clearance Distance (d), (d')
100 V	Japan	$R \geq 1 \text{ M}\Omega / 500 \text{ V DC}$	AC 1 kV 1 minute	$d, d' \geq 3 \text{ mm}$
100 to 240 V			AC 1.5 kV 1 minute	$d, d' \geq 4 \text{ mm}$
110 to 130 V			AC 900 V 1 minute	$d, d' \geq 3.2 \text{ mm}$
110 to 130 V	Europe & Australia	$R \geq 10 \text{ M}\Omega / 500 \text{ V DC}$	AC 3 kV 1 minute (Class II)	$d \geq 4 \text{ mm}$
200 to 240 V			AC 1.5 kV 1 minute (Class I)	$d' \geq 8 \text{ mm (Power cord)}$ $d' \geq 6 \text{ mm (Primary wire)}$

Table 1 Specifications for each region

AC Line Voltage	Region	Load Z	Leakage Current (i)	a, b, c
100 V	Japan	$1 \text{ k}\Omega$	$i \leq 1 \text{ mA rms}$	Exposed accessible parts
110 to 130 V	USA & Canada	$0.15 \mu\text{F}$ and $1.5 \text{ k}\Omega$	$i \leq 0.5 \text{ mA rms}$	Exposed accessible parts
110 to 130 V 220 to 240 V	Europe & Australia	$2 \text{ k}\Omega$	$i \leq 0.7 \text{ mA peak}$ $i \leq 2 \text{ mA dc}$	Antenna earth terminals
		$50 \text{ k}\Omega$	$i \leq 0.7 \text{ mA peak}$ $i \leq 2 \text{ mA dc}$	Other terminals

Table 2 Leakage current specifications for each region

Note: These tables are unofficial and for reference only. Be sure to confirm the precise values for your particular country and locality.

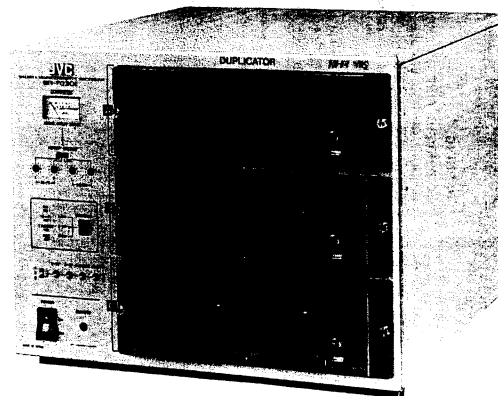
# INSTRUCTIONS

# JVC

# BR-7030E

Hi-Fi VHS DUPLICATOR  
DUPLICATEUR Hi-Fi VHS  
Hi-Fi VHS-DUPLIKATOR

VHS Hi-Fi



### Warning Notice FOR YOUR SAFETY (Australia)

1. Insert this plug only into effectively earthed three-pin power outlet.
2. If any doubt exists regarding the earthing, consult a qualified electrician.
3. Extension cord, if used, must be three-core correctly wired.

### IMPORTANT (In the United Kingdom) Mains Supply (AC 240 V~) WARNING – THIS APPARATUS MUST BE EARTHED

The wires in this mains lead are coloured in accordance with the following code;

GREEN-and-YELLOW:	EARTH
BLUE:	NEUTRAL
BROWN:	LIVE

As the colours of the wires in the mains lead of this apparatus may not correspond with the coloured markings identifying the terminals in your plug, proceed as follows. The wire which is coloured GREEN-AND-YELLOW must be connected to the terminal in the plug which is marked with the letter E or by the safety earth symbol  $\perp$  or coloured GREEN or GREEN-AND-YELLOW. The wire which is coloured BLUE must be connected to the terminal which is marked with the letter N or which is coloured BLACK. The wire which is coloured BROWN must be connected to the terminal which is marked with the letter L or coloured RED.

### POWER SYSTEM

#### Connection to the mains supply

The operating voltage of this set is preset to 240 V~ at the factory.

Before connecting to mains, check that the voltage selector on the rear panel is set to the same voltage as your local mains supply.

#### Adapting to local power line

This set operates on either 220 or 240 V~ AC, 50/60 Hz. If the preset voltage is different from the power line voltage in your area, reset the voltage selector by inserting a screwdriver into the slot of the voltage selector and turning it until the correct voltage is displayed.

This equipment has been produced to comply with Directive number 82/499/EEC.

### WARNING:

**TO PREVENT FIRE OR SHOCK  
HAZARD, DO NOT EXPOSE THIS  
APPLIANCE TO RAIN OR MOISTURE.**

### CAUTION

To prevent electric shock, do not open the cabinet. No user serviceable parts inside. Refer servicing to qualified service personnel.

**Note:** The rating plate and the safety caution are on the rear of the unit.

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## PRECAUTIONS

### Operating

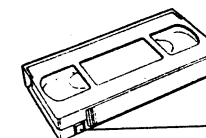
- The BR-7030E can only be used as a recorder in dubbing. Most operations including Play, Rec, FF, REW and Stop can only be performed using an optional remote control connected to the front or rear panel remote connector.
- The Play mode which can be entered using the remote control is only for testing and no playback or EE picture is available.
- Do not attempt to remove a malfunctioning recording unit while other units are recording as this will affect the recording units which are operating.

### Handling and storage

- Avoid using the recorder under the following conditions:
  - extremely hot, cold or humid places,
  - dusty places,
  - near appliances generating strong magnetic fields,
  - places subject to vibrations, and
  - poorly ventilated places.
- Be careful of moisture condensation. Avoid using the recorder immediately after moving it from a cold place to a warm place or soon after heating a room which was cold. The water vapor in warm air will condense on the still-cold video head drum and tape guides and may cause damage to the tape and the recorder.
- Handle the recorder carefully.
  - Do not block the ventilation openings.
  - Do not place anything heavy on the recorder.
  - Do not place anything which might spill and cause trouble on the top cover of the recorder.
  - Use in horizontal (flat) position only.
- In case of transportation,
  - Avoid violent shocks to the recorder during packing and transportation.
  - Before packing, be sure to remove the cassette from the recorder.

### Video cassettes

- This recorder employs VHS cassettes only.
  - VHS: E-240 for 240 minutes, E-180 for 180 minutes, E-120 for 120 minutes, E-90 for 90 minutes, E-60 for 60 minutes and E-30 for 30 minutes of recording.
- Video cassettes are equipped with a safety tab to prevent accidental erasure. However, as this unit is a duplicator, it can record on cassettes whether this tab is present or not.




Safety tab

- Avoid exposing the cassettes to direct sunlight. Keep them away from heaters.
- Avoid extreme humidity, violent vibrations or shocks, strong magnetic fields (near a motor, transformer or magnet) and dusty places.
- Place the cassettes in cassette cases and position vertically.

## FEATURES

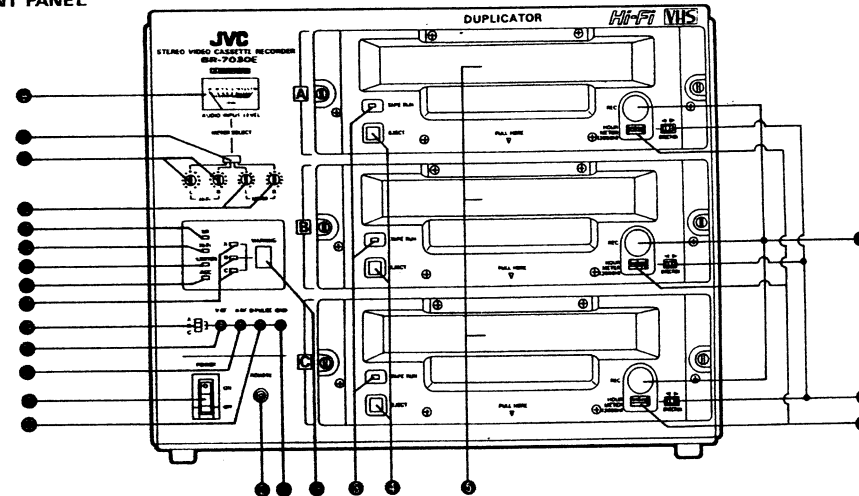
- **More recording units in less space**  
With three individual VHS recording units built into a single cabinet, the BR-7030E permits much more efficient use of space. A single standard duplicator rack can accommodate 4 or 5 three-in-one BR-7030E's (12 or 15 recording units) whereas 8 or 10 single-chassis BR-7000ERA's occupy one duplicator rack. That means that with the BR-7030E, an equivalent number of recording units take up 50 % less space.
- **Reduced power consumption**  
The BR-7030E's three-in-one design also permits significant savings in one of today's most critical areas — energy. One BR-7030E consumes 64 watts — about 22 watts per recording unit whereas a single BR-7000ERA consumes 43 watts. So power consumption per recording unit is reduced by half.
- **Lower equipment costs**  
Additional equipment costs are drastically reduced with the BR-7030E because it requires no more cables (video, audio, remote, power) than a single BR-7000ERA. In terms of recording units, that means that the number of necessary cables for the BR-7030E is one-third the number required by the BR-7000ERA.
- **Superior high fidelity sound**  
To ensure the very best high fidelity video sound, the BR-7030E uses two rotary heads designed exclusively for Hi-Fi VHS recording. The result is superior performance characteristics — wider frequency response, dynamic range of more than 87 dB, and minimal wow and flutter.

- **Self-diagnostic warning system**  
For continuous high-performance operation and long-term reliability, the BR-7030E has a built-in self-diagnostic warning system. A large warning code indicator window and three LEDs — one for each recording unit (A, B, or C) — alert operators to any malfunctions and specify the malfunctioning unit.
- **Other Features**
  - One 34-pin parallel and two serial remote control connectors.
  - Three tape run indicators.
  - Three 2000-hour meters. (After every 2000 hours of operation, the meter direction can be reversed with the DIRECTION switch.)
  - Audio input level meter with four-position switch (Hi-Fi L, Hi-Fi R, NORMAL L, NORMAL R) and independent level control knobs for four channels.
  - Three large REC indicators: light during recording, blink for warning.
  - ID address code input connector for use with an external VHS Address Code Generator. A plug-in module is available from JVC (SA-K14U) to permit coding without external connection.
  - Front panel test points with recorder unit selectors.
  - Warning output connector for external concentrated control of the entire duplicating system.
  - Each recorder unit can be independently removed and replaced with a new unit. Replacement units are optionally available from JVC (SA-K7030E).
  - Automatic head cleaning mechanism.
  - Dolby noise reduction system.

\*Dolby noise reduction manufactured under license from Dolby Laboratories Licensing Corporation. "DOLBY" and the double-D symbol  are trademarks of Dolby Laboratories Licensing Corporation.

## CONTROLS AND CONNECTORS

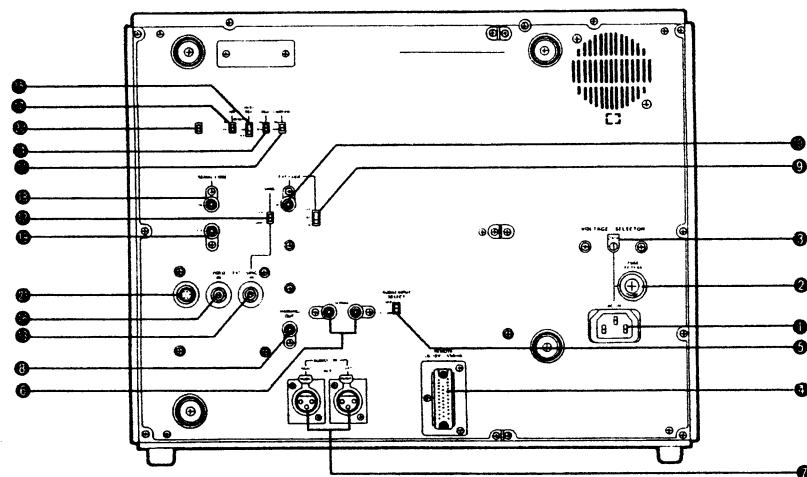
### FRONT PANEL



- **Power switch**  
Press to turn the power on. The level meters will be illuminated. Press again to switch the power off.
- **Remote terminal (3.5 mm dia.)**
- **TAPE RUN indicators**  
These light when a cassette is inserted in the corresponding slot and blink when the tape is running; the frequency with which they blink varies according to the tape speed.
- **EJECT buttons**  
Press to eject the cassette. These buttons can be pressed in the Stop mode or immediately after the STOP button has been pressed.
- **Cassette loading slots**  
With the POWER button pressed to on, insert cassettes with their labelled edges towards you. The cassette carriages will automatically take control and move the cassette into its correct position. When a cassette is loaded, the corresponding TAPE RUN indicator will light.
- **HOURLY METERS**  
These indicate the accumulated operating time of each cassette unit. After 2,000 hours of operation, the red line will move to the end of the scale.
- **REC indicators**  
These light when a unit is in the recording mode and blink in the warning mode.
- **DIRECTION switches**  
These select the direction of the hour meters. After 2,000 hours of use, when the red line moves to the end of the scale, switch these to reverse its direction of movement.
- **AUDIO INPUT LEVEL meter**  
This indicates the level of the left or right hi-fi or normal audio signal according to the setting of METER SELECT switch.
- **METER SELECT switch**  
4-Position switch (Hi-Fi/L, Hi-Fi/R, NORMAL/L, NORMAL/R) which selects the operation mode of AUDIO INPUT LEVEL meter.
- **Hi-Fi LEFT/RIGHT AUDIO INPUT LEVEL controls**  
Adjust the left or right hi-fi recording level by turning these

- controls so that meter ① deflects to "0" at the peak signal, with switch ② set appropriately.
- **NORMAL LEFT/RIGHT AUDIO INPUT LEVEL controls**  
Adjust the left or right normal recording level by turning these control so that meter ③ deflects to "0" at the peak signal, with switch ④ set appropriately.
- **Noise Reduction (NR) indicator**  
Lights when the rear panel noise reduction (NR) switch ⑤ is set to ON.
- **Hi-Fi indicator**  
Lights when hi-fi audio signals are being recorded.
- **LIMITER indicator**  
Lights when the rear panel LIMITER switch ⑥ is set to ON.
- **AGC indicator**  
Lights when the video AGC is activated.
- **Warning indicators (A, B, C)**  
When any unit enters the warning mode, the corresponding indicator (A, B or C) will blink (See page 6)
- **Warning indicator (digital)**  
A number or letter is displayed, indicating the nature of the malfunction, for easy troubleshooting. For more details, refer to page 6.
- **TEST POINT select switch**  
Selects the unit to which test points ⑦ — ⑩ correspond.
- **Video head output test point (V-RF)**  
The video head signal is output in the form of an FM signal during playback, for the detection of clogged or worn heads.
- **Hi-Fi audio head output signal test point (A-RF)**  
The hi-fi audio signal is output in the form of an FM signal during playback, for the detection of clogged or worn heads.
- **D-PULSE pin**  
Connect to the external trigger terminal of the oscilloscope.
- **GND pin**  
Connect to the ground terminal of the oscilloscope.

## REAR PANEL



① **AC input socket (AC IN)**  
Connect to a 220/240 V AC, 50/60 Hz power outlet.

② **FUSE holder**

③ **Voltage selector (VOLTAGE SELECTOR)**  
See "POWER SYSTEM" on page 1.

④ **REMOTE control connector (34-pin)**

⑤ **Audio input select switch**

**SEP:** Set to this position to record signals input to the Hi-Fi AUDIO IN connectors on the hi-fi audio track and the signals input to the NORMAL AUDIO IN connectors on the longitudinal audio track, for "separate" recording.

**N COM:** Set to this position to record signals input to the NORMAL AUDIO connectors on both the hi-fi and longitudinal audio tracks, for "normal combined" recording.

⑥ **NORMAL AUDIO IN connectors (left and right)**

⑦ **Hi-Fi AUDIO IN connectors (left and right)**

⑧ **WARNING OUT connector**

Delivers warnings to an external unit.

⑨ **EXT CODE select switch**

**EXT:** Set to this position to record address codes supplied from an external address code generator connected to EXT CODE IN connector ⑩.

**INT:** Set to this position to record address codes supplied by the optional address code generator kit(SA-K14U).

**OFF:** Set to this position when address codes are not required.

⑩ **EXT CODE IN connector**

⑪ **LIMITER select switch**

Set to ON to activate the built-in audio limiter circuit. This is switched on and off simultaneously for the two audio tracks; manual level control is possible even when the limiter circuit is switched on.

⑫ **SYNC select switch**

For selecting between different reference sync signals for the servo systems during recording.

**EXT:** To lock to the external sync signal applied to the SYNC IN connector on the rear panel.

**VIDEO:** To lock to the incoming video signal.

⑬ **EXT SYNC IN connector**

⑭ **AGC select switch**

Set to ON to activate the built-in video AGC circuit.

⑮ **Hi-Fi REC select switch**

**ON:** Set to this position to record hi-fi audio signals.

**OFF:** Set to this position when hi-fi audio signals are not to be recorded.

**REMOTE:** Set to this position when a serial remote control unit is used.

⑯ **VIDEO IN connector**

⑰ **NR select switch**

Set to ON to activate the built-in Dolby® noise reduction system to reduce tape hiss.

⑱ **SERIAL CODE (remote control) IN connector**

⑲ **SERIAL CODE (remote control) OUT connector**

⑳ **Dummy switch**

㉑ **Dummy connector**

## WARNING DISPLAY

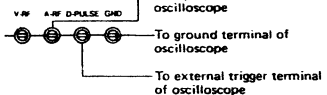

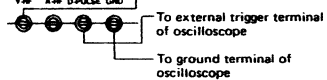

The WARNING display indicates various malfunctions and warnings for each unit by numerical codes.

	Code	Cause of trouble/warning	Symptom/Operation
Loading Mechanism	1	Tape cannot be loaded.	STOP mode is engaged and, all controls except EJECT are inoperative. Recovers when a cassette is inserted again.
	2	Tape cannot be unloaded.	All operations stop and all controls are inoperative. Recovers when the power switch is off.
Cassette Compartment	3	Cassette compartment does not retract.	The cassette is ejected. Recovers when a cassette is inserted again.
	4	Cassette compartment does not lift.	Same as Code NO. 1
Rotating System	6	Drum motor stops.	Same as Code NO. 1
	7	Capstan motor stops.	Same as Code NO. 1
	8	Reel rotates abnormally (e.g. tape slack).	Same as Code NO. 1
Others	9	Tape damage (e.g. broken, wrinkled, scratched, etc.)	Same as Code NO. 1
	R	Servo mechanism defective (DC 5 V power supply for servo)	All operations stop and all controls are inoperative. Recovers when the servo circuit is recovered.
	E	Detects tape end during recording mode. (When one tape is shorter than other units.)	Same as Code NO. 1
	F	Drum servo abnormal synchronization	Same as Code NO. 1 during recording mode.
	H	No video input signal (during recording)	Same as Code NO. 1 during recording mode. Otherwise, recovers when video signal is supplied.

**Note:** If one of the three recording units shows a warning 6, 7, 8 or 9, the malfunctioning unit stops with the tape loaded and, therefore, the cassette cannot be ejected from this unit until the other two units stop recording.

## TEST POINTS

The output signals from the Hi-Fi audio heads and video heads are available at the front panel test points. Connect an oscilloscope to these test points to check the performance and condition of the units. Selection of a unit (A, B, or C) can be done with the front panel TEST POINT select switch ●.

Connection	Items to be checked	Standard waveform
<b>Hi-Fi audio head output</b> 	<ul style="list-style-type: none"> <li>• Tape-to-head contact</li> <li>• Tape running stability</li> <li>• Inferior RF after head replacement</li> </ul>	• "+" triggered CH-1 CH-2 
<b>Video head output</b> 	<ul style="list-style-type: none"> <li>• Compatibility of tape pattern</li> <li>• Tape-to-head contact</li> <li>• Tape running stability</li> <li>• Tracking</li> <li>• Video signal recording level</li> <li>• Abnormality in RF</li> </ul> Use a 10:1 probe.	• "+" triggered CH-2 CH-1 

## SPECIFICATIONS

### GENERAL

Format	: VHS (standard recording)
Tape width	: 12.65 mm (1/2 inch)
Tape speed	: 23.39 mm/s (SP mode)
Recording time	: 180 minutes with E-180 cassette
Fast forward/Rewind time	: 4.5 min. for 180 min. tape
Operating temperature	: 5°C to 40°C
Storage temperature	: -20°C to 60°C
Ambient humidity	: 30 % to 80 %
Power consumption	: Approx. 64 watts
Power requirement	: AC 220 V/240 V~, 50/60 Hz
Dimensions	: 430 mm(W) x 345 mm(H) x 485 mm(D)
Weight	: Approx. 30 kg

### VIDEO (REFERENCE SPECIFICATIONS)

Recording system	: Rotary two-head, helical scanning system
	Luminance: FM recording
	Colour: Down-converted direct recording
Video signal system	: PAL-type colour signal
Input level (line)	: 0.5 ~ 2.0 Vp-p, 75 ohms, unbalanced
Signal-to-noise ratio	: 43 dB (Colour)
Horizontal resolution	: 240 lines (Colour)

### AUDIO (REFERENCE SPECIFICATIONS)

Input level (line)	: -6 dBs, 10 k-ohms, (balanced/Hi-Fi, unbalanced/Normal)
Signal-to-noise ratio	: 46 dB (NR-on, at 3 % distortion)
	: 42 dB (NR-off, at 3 % distortion)
Frequency response	: 20 to 20,000 Hz (Hi-Fi)
	: 40 to 12,000 Hz (Normal)
Wow and flutter	: Less than 0.006% wrms (Hi-Fi)
(Self-recording & PB)	: Less than 0.2% wrms (Normal)
Dynamic range	: 87 dB (Hi-Fi)

\*VIDEO & AUDIO SPECIFICATIONS ARE BASED ON PLAYING BACK BY STANDARD PLAYER/RECORDER.  
\*DESIGN AND SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

## SECTION 1 DISASSEMBLY

### 1.1 REMOVING OF EXTERNAL COVERS

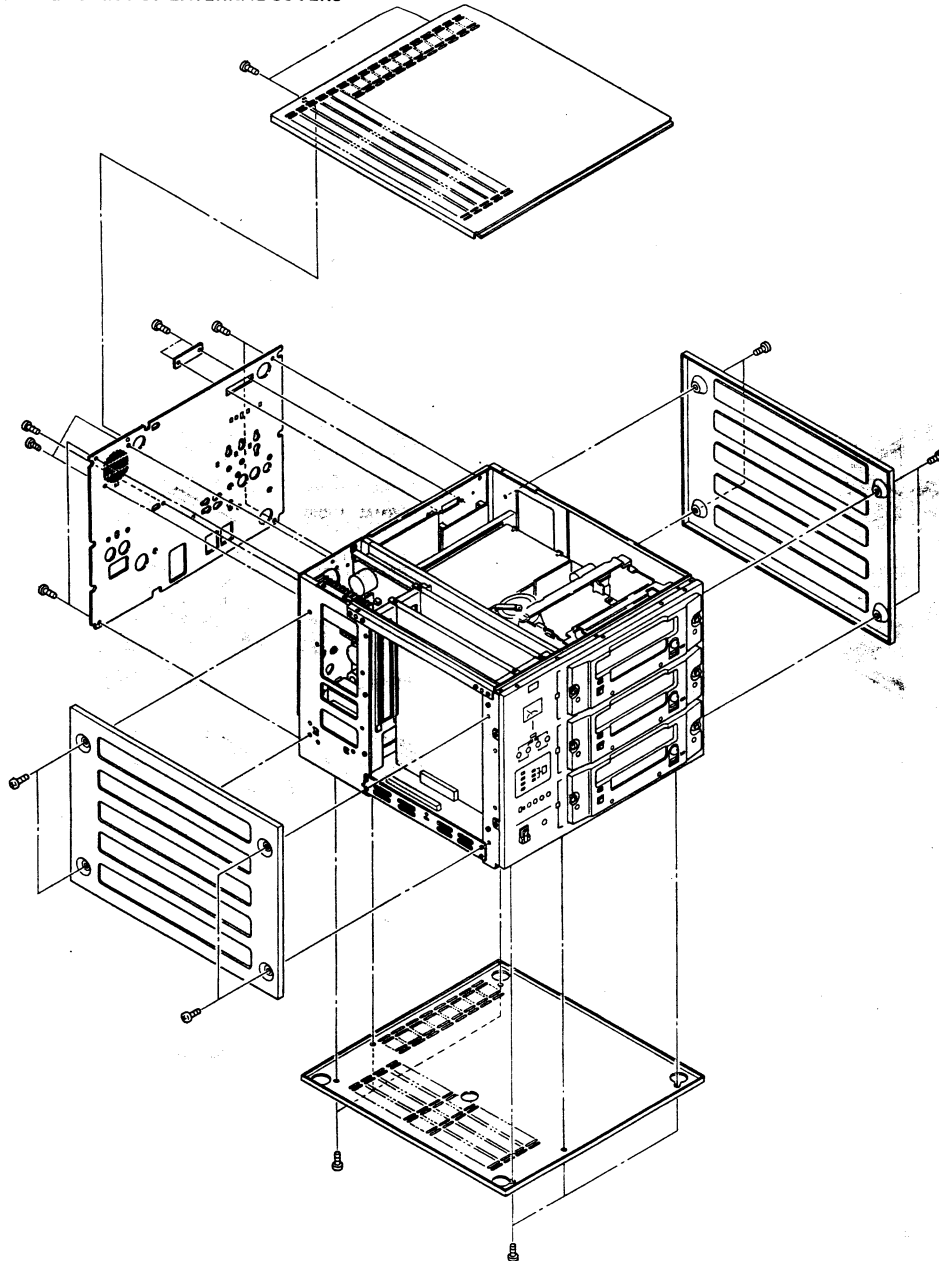


Fig. 1-1 Removing of external covers

#### 1.1.1 Mechanism units A, B and C

Since the electrical circuits and the mechanisms of the mechanism units A, B and C are completely the same even in all of parts, descriptions of the following items are common to the three mechanism units.

Refer to such the descriptions for each unit.

- Sections 4.25 through 4.37 of standard circuit diagrams and illustrations of parts locations by board.
- Sections 5.2.7 through 5.2.9 of exploded views and parts lists.
- Regarding electrical parts lists of board assemblies, the lists with asterisk ( \* ) marks in the following table are common to the three units.

Board No.	Board Name
[0 1]	AUDIO
[0 2]	VIDEO
[0 3]	SYSCON
[0 4] *	NORMAL AUDIO
[0 5] *	VIDEO PRE/REC
[0 6] *	SERVO & FM AUDIO PRE/REC
[0 7]	MOTHER
[0 8]	REAR-2
[0 9]	FRONT-1 (FRONT VR & SWITCH)
[1 0]	FRONT-1 (DISPLAY)
[1 1]	FRONT-2 (TERMINAL)
[1 2]	FRONT-2 (REMOTE JACK)
[1 3]	REAR-1
[1 4]	POWER
[1 5]	SELECT SWITCH
[1 6] *	HOURLY METER & LED
[1 8] *	SWITCH & LED
[2 0] *	REEL MDA
[2 1] *	DECK TERMINAL
[2 2] *	RELAY
[2 3] *	REC SAFETY
[2 4] *	END SENSOR
[3 1]	REAR SUB
[3 5] *	A/C HEAD
[4 1]	POWER TRANSISTOR
[4 2]	POWER IC
[5 6] *	CASSETTE HOUSING

#### IMPORTANT:

To operate the BR-7030E, it needs to connect a remote controller (PU52097B-1) with a remote cable (PU52768A,  $\phi$  3.5 minijack).

Place an order with JVC Parts Center for them.

#### 1.1.2 Mechanism unit SA-K7030E

All the parts of the electrical circuit and the mechanism of the mechanism unit SA-K7030E are the same as those of the mechanism units A, B and C.

Refer to Section 1.1.1.

#### 1.1.3 ID code unit SA-K14U

For parts of the electrical circuit of the ID code unit SA-K14U, refer to Sections 4.38 through 4.39 of standard circuit diagrams and illustrations of parts locations by board.

## 1.2 REMOVING OF MAIN BOARDS

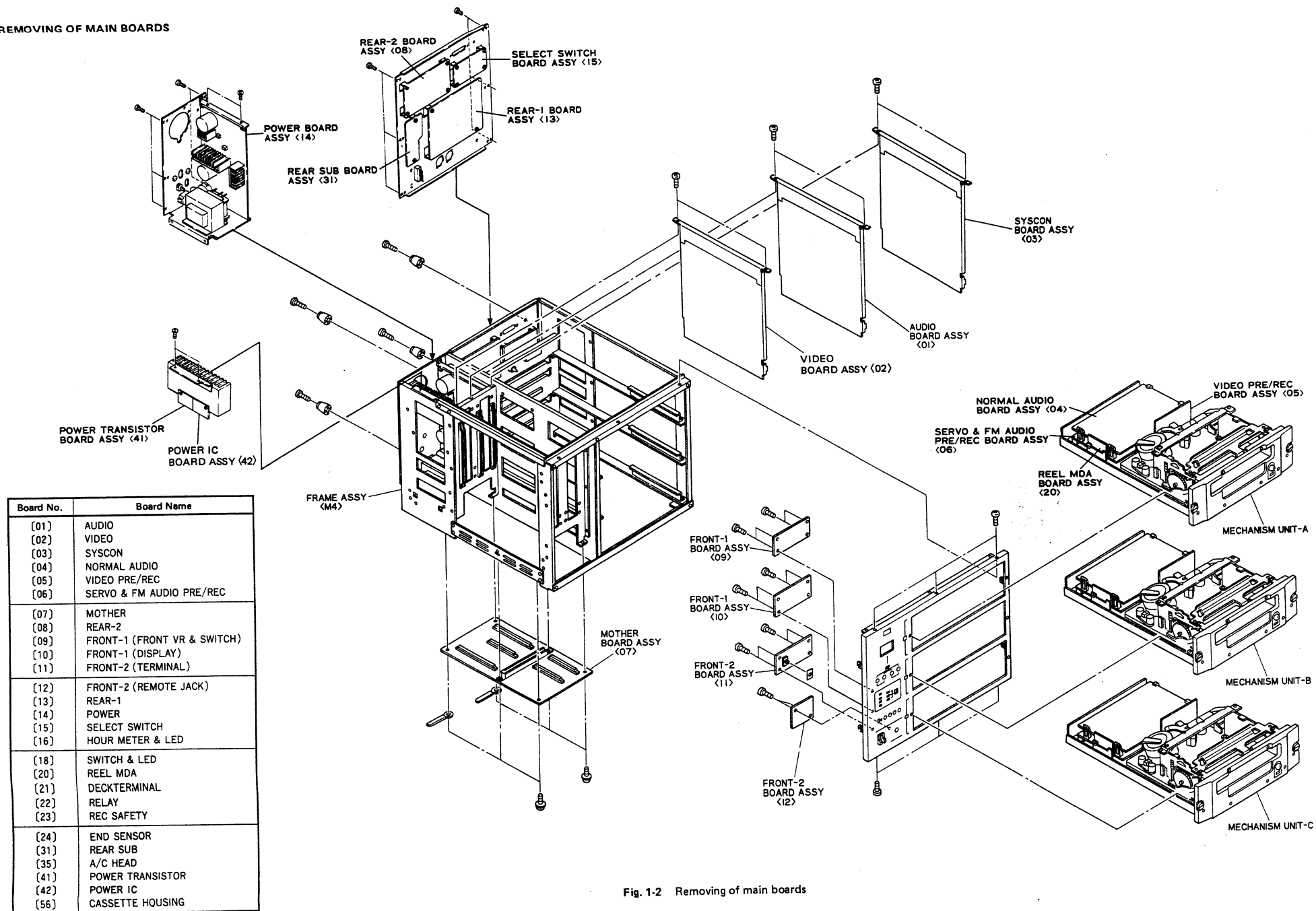


Fig. 1-2 Removing of main boards



### 1.3 ID CODE UNIT SA-K14U (optional)

The following describes how to connect the ID code unit to other recorders than the BR-7030E.

By modifying a recorder other than the BR-7030E, ID code can be read by the recorder.

Fig. 1-3 shows a connection manner for the BR-7000ER and BR-6600E, while Fig. 1-4 shows that for the BR-7000ERA.

#### Note:

1. The shielding wire to be used for a connection between TP5 and pin 4 of IC4 on the CAP SERVO board is provided with the SA-K15JX.
2. Extend the wires to connect pins 5 and 6 of CN29 of the SYSCON board with the ID CODE board ass'y, because they are short of length.
3. Pin 3 of CN1 of the ID CODE board ass'y is N.C.
4. The connection by the above manner is not for recording ID code but only for reading ID code.

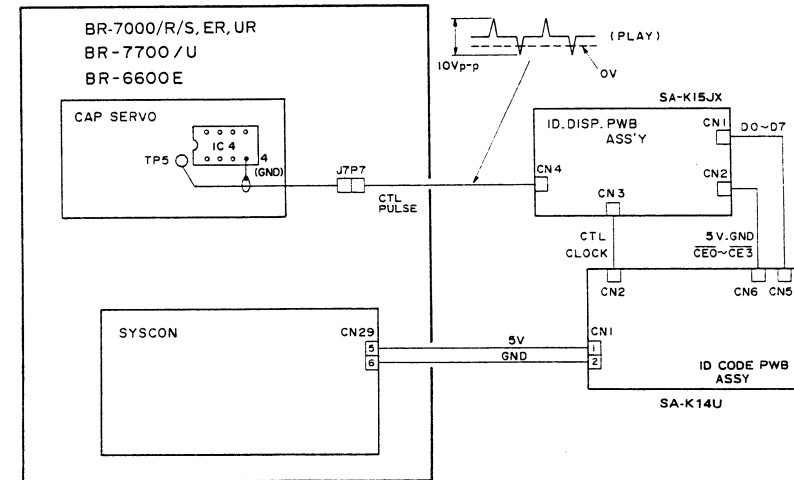


Fig. 1-3

#### Note:

1. Extend the wires for connection between the ID CODE board ass'y SA-K14U (CN2 pin 2, CN1 pins 1 and 2) and a VTR, because they are short of length.
2. Pin 1 of CN2 and pin 3 of CN1 of the ID CODE board ass'y are N.C.
3. CN3 and CN4 of the ID CODE DISP. board ass'y are N.C.
4. The connection shown in Fig. 1-4 is not for recording ID code but only for reading it.
5. It is also possible to come by CTL pulse signal from TP3 of the D/C SERVO board [2] [1].

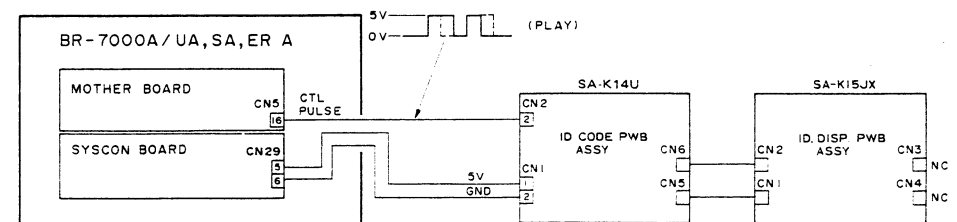


Fig. 1-4

#### 1.4 OUTPUT CONNECTOR FOR QC

To get the output connector wire ass'y for QC, place an order with JVC parts center for the Parts No. PGJ05026. At the same time, purchase a 25-pin D SUB connector as the male connector. (Hirose CL211-0215-7 or equivalent) By using the output connector for QC, the following items can be checked up.

1. VIDEO RF OUT A-C CN18\*
2. AUDIO RF OUT A-C CN19\*
3. DRUM FF OUT A-C CN20\*
4. L CH NOR PB OUT A-C CN21\*
5. R CH NOR PB OUT A-C CN21\*

\* All are located on the REAR-2 board [08].

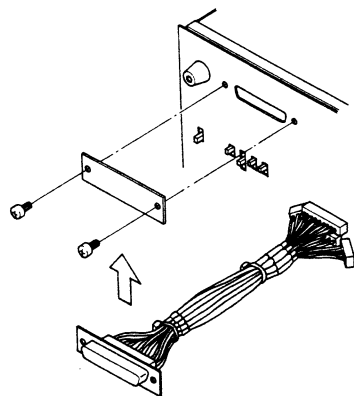


Fig. 1-5

<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 13 12 11 10 9 8 7 6 5 4 3 2 1  25 24 23 22 21 20 19 18 17 16 15 14 </div> (VTR)										17	R-CH NOR PB OUT (c)
1	V-RF OUT (a)	9	A-RF OUT (b)	18	L-CH NOR PB OUT (c)	19	R-CH NOR PB OUT (b)	20	L-CH NOR PB OUT (b)	21	R-CH NOR PB OUT (a)
2	GND	10	GND	22	L-CH NOR PB OUT (a)	23	GND	24	DRUM FF OUT (c)	25	DRUM FF OUT (b)
3	V-RF OUT (b)	11	A-RF OUT (c)	26	L-CH NOR PB OUT (a)	27	GND	28	DRUM FF OUT (c)	29	DRUM FF OUT (b)
4	GND	12	GND	30	L-CH NOR PB OUT (a)	31	GND	32	DRUM FF OUT (c)	33	DRUM FF OUT (b)
5	V-RF OUT (c)	13	DRUM FF OUT (a)	34	L-CH NOR PB OUT (a)	35	GND	36	DRUM FF OUT (c)	37	DRUM FF OUT (b)
6	GND	14	EJECT CMD (c)	38	L-CH NOR PB OUT (a)	39	GND	40	DRUM FF OUT (c)	41	DRUM FF OUT (b)
7	A-RF OUT (a)	15	EJECT CMD (b)	42	L-CH NOR PB OUT (a)	43	GND	44	DRUM FF OUT (c)	45	DRUM FF OUT (b)
8	GND	16	EJECT CMD (a)	46	L-CH NOR PB OUT (a)	47	GND	48	DRUM FF OUT (c)	49	DRUM FF OUT (b)

#### 1.5 FAN MOTOR

When a number of BR-7030E's are used being laid one on top of another, make sure to use the specified fan motors. The fan motor (PGZ00708 provided for BR-S810E, BR-S610E) and the screw (DPSP3030Z) will be provided by placing your order with JVC parts center for them. To connect the connector, cut off a part of the rear panel just under the section to install the fan motor, and connect it to CN4 of the POWER board [14] via the hole.

#### 1.6 CONNECTION OF ID CODE UNIT\* FOR BR-7030E (\* optional accessory for SA-K14U)

##### 1.6.1 How to connect

1. Draw out each mechanism base of the three mechanism units of the BR-7030E. Facing the SA-K14U's parts side to the front, fix it to the section of the 24-pin connector located on the back of the mechanism base with screws GBST3006.

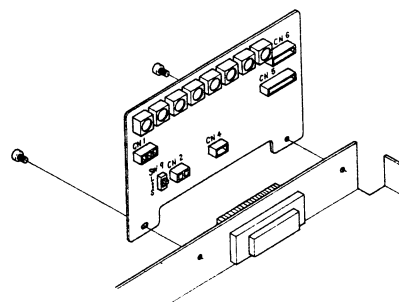


Fig. 1-6

2. Open the NORMAL AUDIO board attached to the mechanism base.
3. Disconnect the wire of CN2 (2-pin connector) of the S & F PRE/REC board.
4. Connect the connectors of the SA-K14U and the S & F PRE/REC board as shown in the figure.

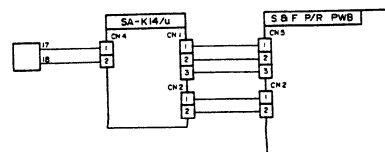


Fig. 1-7

5. Connect CN5 to CN1 on the SA-K14U using 3-plug connector (gray/gray/brown colored lead).
6. After detach the 2-plug connector from CN2 (gray/purple colored lead), reconnect it to CN4 on the SA-K14U.
7. Connect CN2 to CN2 on the SA-K14U using 2-plug connector (gray/red colored lead).

(RECORDING UNIT board)

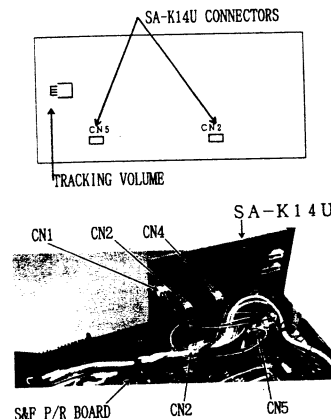


Fig. 1-8

- TRACKING volume:  
For adjustment of tracking in playback of test tapes, etc. Adjustable with checking output signal level delivered from the V-RF connector on the front panel.

#### 1.6.2 Recording of ID code

1. Set the EXT CODE switch on the rear panel to "INT".
2. Set the data (8 digits) to record by SW1 to SW8.

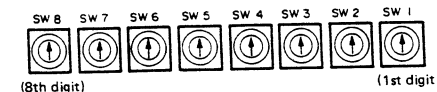


Fig. 1-9

For data indication, SW1 is for the 1st digit and SW8 is for the MSD (8th digit).

3. In the same manner, set the ID code unit by digits.
4. Recording time can be set by use of the selector switch SW9 of the ID CODE board.  
To record over the whole length of the tape, set SW9 to "L" (factory setting), while set it to "S" for 1 minute recording.
5. By setting the BR-7030E to the REC mode, data of boards can be recorded by unit.

#### 1.6.3 Read (playback) of ID code

1. Connect the SA-K14U and SA-K15JX (ID code display - optional) to the BR-7030E by connecting the 8-pin connector of the SA-K15JX to CN5 of the SA-K14U and the 6-pin connector to CN6 of the SA-K14U. (See Fig. 1-10)
2. When performing read (playback) from a video tape on which recording was made over the length, it may start at any point. On the other hand, for playback of a tape on which recording was made at a unit of 1 minute, it is required to rewind the tape to the point where the recording was started.
3. Set the BR-7030E to the PB mode.  
Adjust the Tracking VR (R18) of the S & F PRE/REC board.
4. About 10-15 seconds after the set entered the PB mode, ID code of 8 digits is indicated in the LED display of the SA-K15JX.

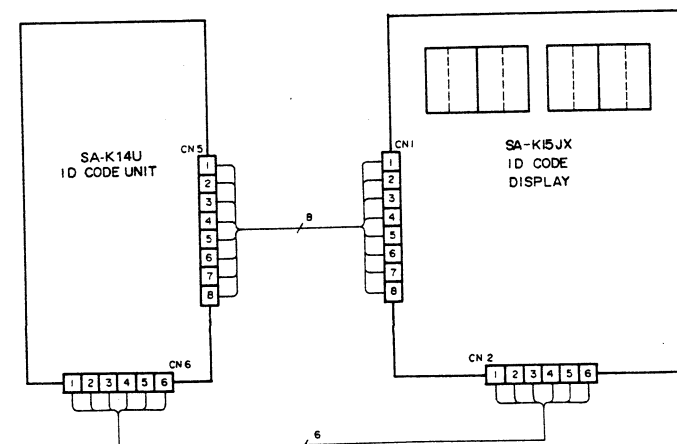


Fig. 1-10

## 1.7 ID CODE SPECIFICATIONS

(Recording and playback of 8-digit BCD data according to the VASS system)

### ■ Recording

- Recording is performed with the recording format specified for VASS (Video Address Search System) codes of the CTL Coding System in the VHS video cassette system standards.
- The VASS recording format records 4-digit BCD numbers. To record an 8-digit number, two VASS code units with a specified interval are used as shown below.

### ■ Hardware

- Hardware includes 8 rotary DIP switches for setting an 8-digit data, a slide switch for changing the recording duration of ID data (over the entire tape length or for the beginning one minute), a CPU, and a reset IC.
- The circuit board is constructed in the form of an insert-type single-sided board (110 mm x 65 mm).
- An additional display unit allows indication of data in both recording and playback. The display unit consists of a BCD-to-Decimal converter and a dynamic lighting circuit.

### ■ Software

- Recording and reproduction of VASS 8-digit data
- Reproduction possible in both forward and reverse direction
- Reproduction possible in 4X search
- Recording duration switchable
- Compatible with both NTSC and PAL

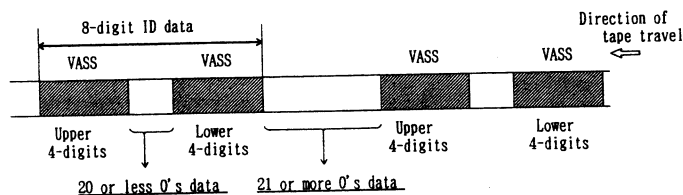


Fig. 1-11

## 1.8 REMOTE CONTROL SYSTEM

The BR-7030E has three types of remote control system; remote connector on the front panel (mini jack), serial code connectors (RCA-pin) and 34-pin parallel connector on the rear panel.

Basically, the way of remote command and coding of both mini-jack remote and serial code are same. However, DC 5V is added to serial code remote system for switching Hi-Fi AUDIO REC ON/OFF.

### ■ Serial code

The BR-7030E has a SERIAL CODING SYSTEM which makes possible remote control.

The BR-7030E SERIAL-CONTROLLED commands are as follows.

#### • COMMAND

- |                 |                           |
|-----------------|---------------------------|
| 1) STOP         | 6) REWIND                 |
| 2) PLAY         | 7) PAUSE                  |
| 3) REC-PLAY     | 8) EJECT                  |
| 4) REC-PAUSE    | 9) Hi-Fi AUDIO REC ON/OFF |
| 5) FAST FORWARD |                           |

#### • SERIAL CODE (LOGICAL "1", "0")

Pulse interval for "0" is 1.05 msec.

Pulse interval for "1" is 2.11 msec.

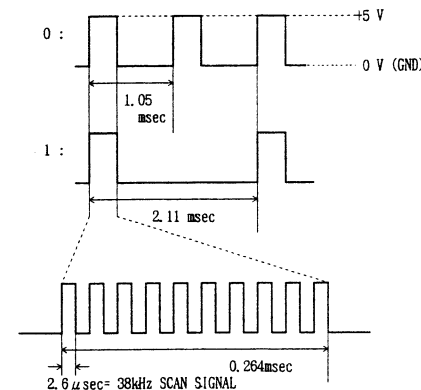


Fig. 1-12

#### • CODING

As indicated below, each command is composed of three key codes (K0, K1, K2) and seven data codes (D0-D6), which are transmitted in 25.3 msec (1 command).

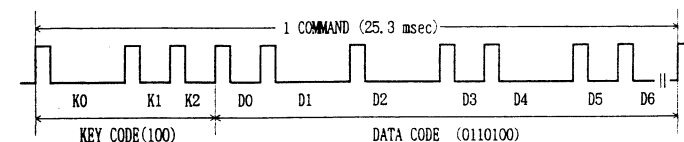


Fig. 1-13

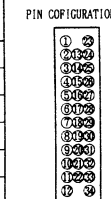
### • DATA CODES

	CODE						
	D0	D1	D2	D3	D4	D5	D6
REC	0	0	1	0	0	* 1	1
PLAY	0	0	1	0	0		0
STOP	1	1	0	0	0		0
FF	0	1	1	0	0		0
REW	1	1	1	0	0		0
PAUSE	1	0	1	0	0		0
EJECT	1	0	0	0	0		0
REC-EE	0	0	1	0	0		1
REC-PAUSE	1	0	1	0	0		1

\*1 : Setting code to select monitor/meter  
Hi-Fi : "1" Normal : "0"

#### • 34-PIN

NO	NAME	NO	NAME	NO	NAME
1	REC CMD	13		25	FF TALLY
2	PLAY CMD	14		26	REW TALLY
3	FF CMD	15		27	
4	REW CMD	16		28	
5	STOP CMD	17		29	PAUSE TALLY
6		18		30	
7	PAUSE CMD	19		31	
8	STOP TALLY	20		32	
9		21	EJECT CMD	33	
10		22		34	12V DC
11		23	REC TALLY		
12	GND	24	PLAY TALLY		



## 1.9 DIP SWITCHES

SYSCON board

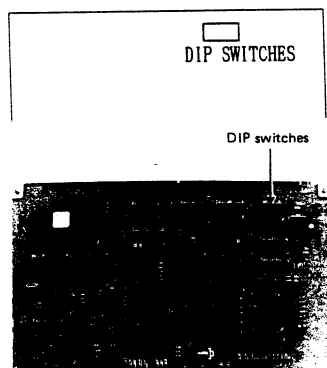


Fig. 1-14

### • DIP switches

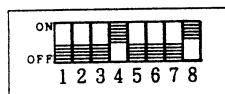


Fig. 1-15

- 1: Set to ON to detect the beginning of REC and enter the STOP mode in FF/REW modes by reading REEL FG.
- 2: Set to ON when the tape reaches its end, automatically rewind to the tape beginning and enter the STOP mode.
- 3: Set to ON when the tape rewinds its beginning, automatically enter the PLAY mode. (In combination with SW-2 and SW-3 FULL REPEAT PLAYBACK function is enabled.)
- 4: Set to OFF to enter the warning mode by detecting the tape end in the recording mode.
- 5: Set to ON not to enter the warning mode when the video signal is not supplied to the video in connector.
- 6: Not used (Keep setting to OFF.)
- 7: Set to ON to enable the eject button on the each unit even in the recording mode.
- 8: Not used (Keep setting to ON.)

## 1.10 AUTO HEAD CLEANING MECHANISM

The head cleaner is controlled by the cleaner lever of the half-loading gear linked to the loading motor. It operates during loading and unloading when drum motor is rotating, cleaning the video and Hi-Fi audio. Head cleaning is thus prevented.

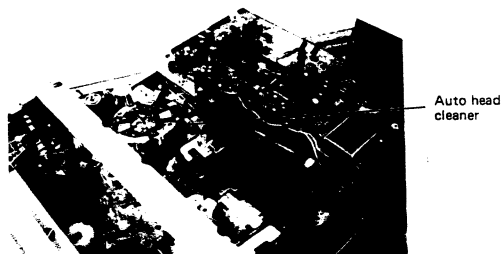
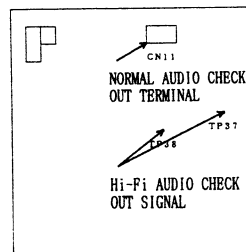


Fig. 1-16

## 1.11 INNER ADJUSTMENT SECTIONS

### • Main unit boards

AUDIO board



- Hi-Fi AUDIO CHECK OUT SIGNAL  
To check Hi-Fi AUDIO signal level (only for E-E signal). TP37 is for channel 1 and TP38 is for channel 2.
- NORMAL AUDIO CHECK OUT connector  
4-pin connector for check of NORMAL AUDIO OUT signal level (from left to right: CH-1 HOT/CH-1 GND/CH-2 GND/CH-2 HOT)

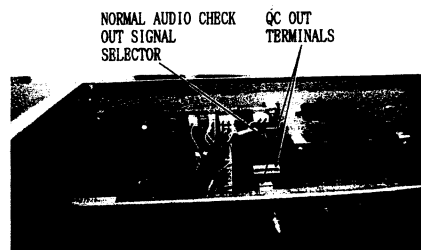
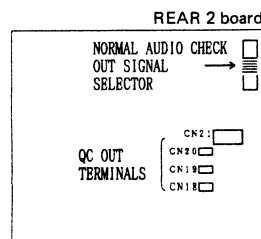


Fig. 1-17

## SECTION 2 MECHANISM ADJUSTMENT

### 2.1 FOREWARD

#### IMPORTANT:

1. Disconnect unit from power before removing or soldering components.
  2. When removing a fastener (screw, washer, etc.), be careful not to drop it into the mechanism. If a fastener should be dropped, be sure to retrieve it.
  3. The tape transport mechanism has been precisely adjusted at the factory and ordinarily does not require re-adjustment.
  4. When removing a part, be very careful not to damage or displace other parts. (Be especially careful with the tape guides and rotary video head drum.)
  5. For service procedures that call for operation of the set when the cassette housing is separated from the main-deck, perform as below.
- 1) Disable the photo transistor sensor (END SENSOR) on the main-deck by applying an opaque cover.
  - 2) The desired modes can be obtained by using the operation switches.

### 2.2 REQUIRED TEST EQUIPMENT, FIXTURES AND TOOLS

For proper mechanical adjustment, the following test equipment, fixtures and tools are strongly recommended. Without them, a long trial-and-error period would be necessary, resulting in possible damage. In addition, general-purpose tools are required.

#### 1. Test equipment required:

- Color television or monitor
- Oscilloscope: Wide-band, dual trace, triggered, delayed sweep
- Recording tape
- Alignment tapes
- Signal generator: PAL color bars, staircase

JVC alignment tapes MH-2/MH-F8	Torque gauge assembly PUJ48075-2 (Torquemeter : 600ATG Torquemeterhead : PUJ48016-2)	Back tension cassette gauge PUJ48076-2
A/CTL head position tool PUJ47351-2	Parallel check plate PUJ50204	

Fig. 2-1 Jigs and adjusting equipment

## 2.3 MAIN PARTS LOCATIONS

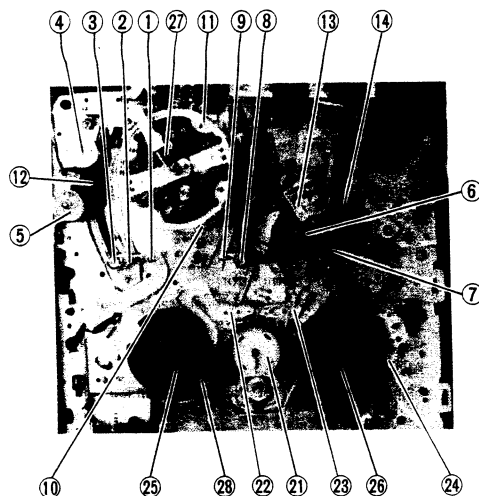


Fig. 2-2 Topview of main-deck

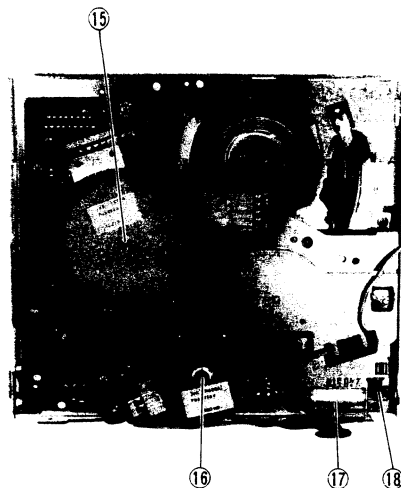


Fig. 2-3 Bottom view of main-deck

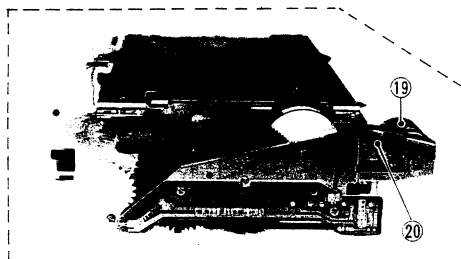


Fig. 2-4 Cassette housing

- |                     |                        |            |
|---------------------|------------------------|------------|
| ① Tension Arm Ass'y | ⑪ Upper Drum           | ⑳ Cassette |
| ② SUP Slant Pole    | ⑫ Full Erase Head      |            |
| ③ SUP Guide Roller  | ⑬ A/C Head             |            |
| ④ Roller Ass'y      | ⑭ Pinch Roller         |            |
| ⑤ Impedance Roller  | ⑮ Capstan Motor        |            |
| ⑥ TU Tape Guide     | ⑯ Reel Motor           |            |
| ⑦ Capstan Shaft     | ⑰ Mode Motor           |            |
| ⑧ TU Guide Roller   | ⑱ Mode Belt            |            |
| ⑨ TU Slant Pole     | ⑲ Cassette Motor       |            |
| ⑩ Lower Drum Ass'y  | ⑳ Cassette             |            |
|                     | ㉑ Reel Idler           |            |
|                     | ㉒ SUP Main Bra         |            |
|                     | ㉓ TU Main Bra          |            |
|                     | ㉔ TU Sub Bra           |            |
|                     | ㉕ SUP. Reel Disk Ass'y |            |
|                     | ㉖ T.U Reel Disk Ass'y  |            |
|                     | ㉗ Brush Ass'y          |            |
|                     | ㉘ Tension Band         |            |

## 2.4 MAIN PARTS REPLACEMENT TABLE

Periodic inspection and maintenance are needed in order to ensure performance and reliability. The following table has been compiled simply to give a general idea regarding maintenance and inspection. In practice, the periods indicated will vary widely according to environmental and usage

conditions. Also be aware that rubber parts may deform and age even when the equipment is not used. The upper drum life is particularly affected by environmental and usage conditions.

No.	Parts Name	Parts No.	Periodic servicing schedule (operating hours)								Ref. sect.	Remarks	
			1000	2000	3000	4000	5000	6000	7000	8000			
Tape transport system													
1	Tension arm ass'y	PQ41944A-7	★	★	★	★	★	★	★	●	Perform cleaning with finely woven cloth or gauze moistened in alcohol.  Confirm that the cleaned locations are thoroughly dry before operating the deck.  For lubrication, use sewing machine oil or good quality spindle oil.  After cleaning with alcohol, apply 1 or 2 drops of oil.		
2	Supply slanted pole	Ass'y No.	★	★	★	●	★	★	★	●			
3	Supply guide roller	PU60556-2-2	★	★	★	★	★	★	★	○			
4	Roller ass'y	PQ43298A	★	★	★	●	★	★	★	●			
5	Impedance roller	PRD42592A	★	★	★	●	★	★	★	●			
6	Take-up guide pole	PRD42661	★	★	★	○	★	★	★	●			
7	Capstan shaft	—	★	★	★	★	★	★	★	★			
8	Take-up guide roller	Ass'y No.	★	★	★	●	★	★	★	●			
9	Take-up slanted pole	PGZ01143	★	★	★	★	★	★	★	○			
10	Lower drum ass'y	PDM2053T	★	★	★	○	★	★	★	●			
11	Upper drum ass'y	PDM2104D	●	●	●	●	●	●	●	●			
12	Full erase head	PU57641-2	★	★	★	★	★	★	★				
13	A/C head	PGZ00588	★	★	★	●	★	★	★	●			
14	Pinch roller arm ass'y	PQ420068	★	★	★	●	★	★	★	●			
Driving system													
15	Capstan motor	PGZ01145	★	○	★	●	★	○	★	●			
16	Reel motor	PU58636W		○		●		○		●			
17	Mode motor	PQ419968				○				●	2.6.2		
18	Mode belt	PQM30003-20		○		●		○		●	2.6.2		
19	Cassette motor	PQ42385A				○				●			
20	Cassette belt	PQM30003-19		○		●		○		●			
21	Idler arm	PU58645-1-4	★	○	★	●	★	○	★	●			
22	Supply main brake	PQ42019A-6				○				●			
23	Take-up main brake	PQ420208				○				●			
24	Take-up sub brake	PQ42037A-2				○				●			
25	Supply reel disk	PU59250-1-2		△		△		△		△			
26	Take-up reel disk	PU58638-1-2		△		△		△		△			
Others													
27	Brush ass'y	PDM4015B				●				●		2.5.2 2.7.1	
28	Tension band ass'y	PQ41948A		○		●		○		●			
29	Head cleaner	PRD40610-01-02	●	●	●	●	●	●	●	●			
											←Perform back tension check		

(★ = Cleaning. ○ = Check, or replace if necessary. ● = Replacement. △ = Lubricate.)

Table 2-1 Main parts maintenance and replacement standard

## 2.5 MAIN ASSEMBLY REPLACEMENT

### 2.5.1 A/C head (Audio/control head)

1. Removal
  - 1) Disconnect connectors from the A/C HEAD PWB.
  - 2) Take out two screws (A), then remove the A/C head and the head base together.
  - 3) Unsolder and separate the A/C HEAD PWB from the A/C head.
  - 4) Take out a screw (B) and remove the shield cap from the A/C head.
  - 5) Take out three screws (C) and separate the A/C head from the head base. Use care regarding springs. Do not lose them.

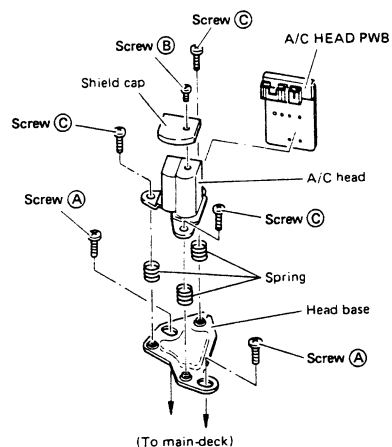


Fig. 2-5 A/C head

#### 2. Installation

- 1) Mount a new A/C head and other peripheral parts on the main-deck by reversing the removal procedure.
- 2) Before installing the A/C head on the main-deck, perform rough-adjustment of A/C head height as shown in Fig. 2-6.

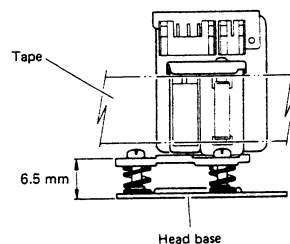


Fig. 2-6 A/C head height

#### 3. Confirmation and adjustment

- 1) Use a recording tape and confirm correct tape transport operation, then perform interchangeability adjustment. Refer to sections 2.8 and 2.9.
- 2) Perform overall confirmation of the Audio circuit. Refer to sections 3.5 and 3.7.1.

### 2.5.2 Tension band assembly

#### 1. Removal

- 1) Take out a screw, then pry the A portion of the tension band assembly upwards to separate it from the tension arm assembly.

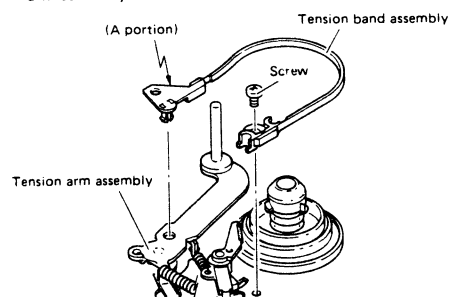


Fig. 2-7 Tension band assembly

#### 2. Installation

- 1) Install a new tension band assembly by reversing the removal procedure.

#### 3. Confirmation and adjustment

- 1) Perform tension pole position adjustment. Refer to section 2.7.1.

## 2.6 ASSEMBLY PROCEDURE OF MECHANISM

The mechanism of this model is mostly engaged to the mechanism control circuit, through the mode select switch. Therefore, the relation between the mode select switch and the control arm decides all mechanical movement of the mechanical parts such as levers, gears, rollers and so on. If these parts are not properly positioned, the unit will be unloaded or compulsorily stopped. This will result in damage of mechanical or electrical parts.

### 2.6.1 Loading arm assembly

Loading arm assembly consists of loading gear, torsion spring and loading arm.

1. Set up the loading arm assembly correctly as shown in Fig. 2-8. Pay careful attention to the points indicated by arrows.

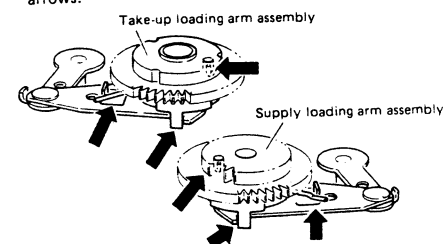


Fig. 2-8 Loading arm assembly (1)

2. Install the take-up loading arm assembly and the supply loading arm assembly so that the holes on the loading gears face each other, as shown in Fig. 2-9. Do not move the loading arm assemblies from this position for the next step.

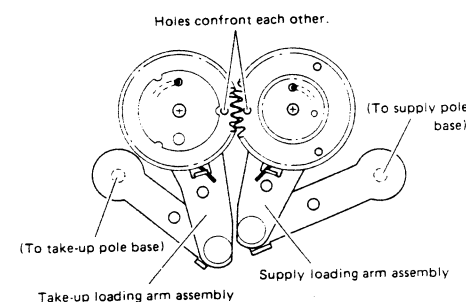


Fig. 2-9 Loading arm assembly (2)

### 2.6.2 Control cam

1. Set the arm gear assembly on the cam bracket assembly so that the hole of the arm gear assembly overlaps the hole of the cam bracket assembly.
2. Install the control cam on the cam bracket assembly so that the hole of the control cam overlaps the hole which is indicated in the step 1), as shown in Fig. 2-10. Do not turn the control cam from this position for the next step.

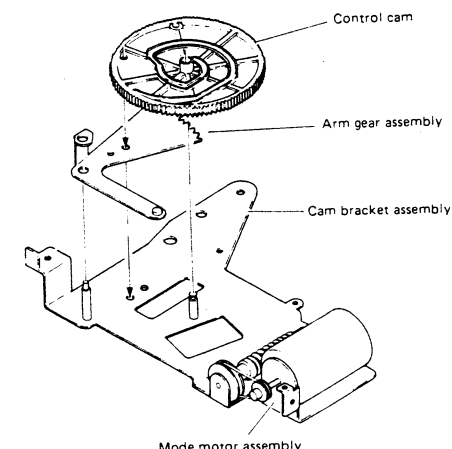


Fig. 2-10 Control cam

### 2.6.3 Cam bracket assembly

1. Push and hold the plate assembly so that the hole of the plate assembly overlaps the hole of the main-deck, as shown in Fig. 2-11.
2. Then mount the cam bracket assembly.

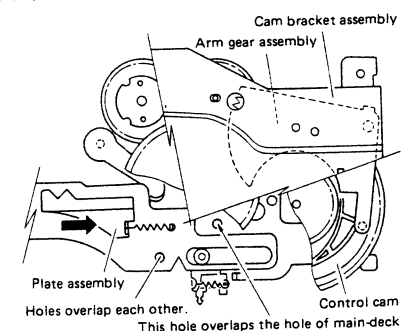


Fig. 2-11 Cam bracket assembly

**Note:** If the arm and loading gears do not mesh properly, use a jeweler's screwdriver or similar tool to engage the gear teeth while installing the cam bracket assembly.

## 2.7 CONFIRMATION AND ADJUSTMENT

### 2.7.1 Tension pole position adjustment

1. Without loading a tape, set for the Play mode. Refer to section 2.1.
2. Loosen screw a little bit, then adjust the tension band holder so that the distance, shown in Fig. 2-12, becomes zero (0 mm).
3. Tighten screw to fix the tension band holder.

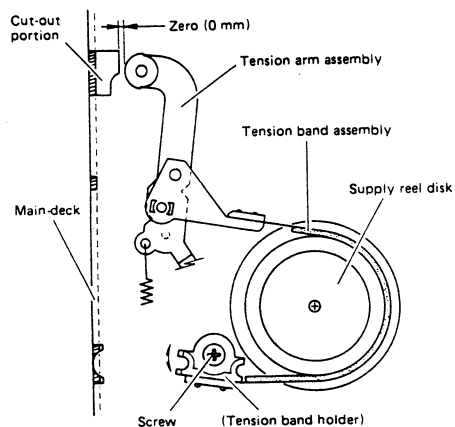


Fig. 2-12 Tension pole position

**Note:** By this adjustment, back tension is within normal specification, in spite of parts tolerances.

4. Use the back tension cassette gauge and set for the Play mode.
5. Confirm that the indication is  $50 \pm 2$  gr-cm.

### 2.7.2 Take-up torque confirmation

1. Set the Play mode without the cassette housing assembly. Refer to section 2.1.
2. Set the torque gauge on the take-up reel disk.
3. The torque gauge consists of upper and lower sections connected by a spring mechanism. Relax the grip on the torque gauge so that the indicator needle and scale rotate at equal speed, then read the indication. The correct value is  $100 \pm 10$  gr-cm.
4. If not, adjust R37 of the Servo & FM Audio PRE/REC board.

## 2.8 TAPE TRANSPORT SYSTEM CONFIRMATION AND ADJUSTMENT

Once adjusted to the complete condition, readjustment of the tape transport system is not necessary, except when the parts that compose the tape transport system are replaced due to troubles by long usage or unexpected accidents.

### 2.8.1 Tape transport system adjustment

#### 1. Guide roller

To get the FM envelope into ideal shape for interchangeability, the height adjustment of the guide roller is needed.

Before turning the guide roller, slightly loosen the set-screw located under the guide roller. For loosening the setscrew, use the hex key (1.25 mm).

**Note:** Loosen the setscrew enough to allow the guide roller to be turned. If excessively loose, tape motion may turn the guide roller inadvertently.

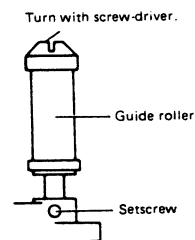


Fig. 2-13 Guide roller

#### 2. Impedance roller

Normally, do not adjust the height of the impedance roller. Only when the defects of tape travel are noted at the impedance roller, after complete adjustment for interchangeability, adjust the height of impedance roller to obtain smooth tape travel. For adjustment of impedance roller height, use the nut-driver (5.5 mm).

**Note:** Do not lower the impedance roller excessively to avoid the defects of tape travel. Tape must be along the lower flange located under the impedance roller.

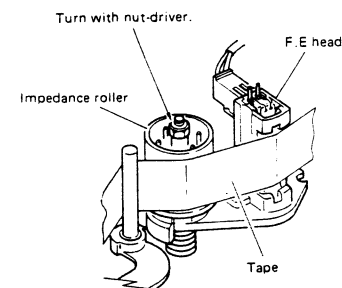


Fig. 2-14 Impedance roller

#### 3. A/C head (audio/control head)

When defects of tape travel are noted at the take-up guide pole, adjust the inclination of A/C head to obtain smooth tape travel.

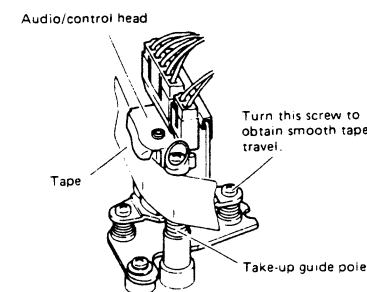


Fig. 2-15 A/C head

## 2.9 INTERCHANGEABILITY CHECKS AND ADJUSTMENTS

**Note:** Before using Alignment tape, use a spare tape and confirm normal transport operation.

### 2.9.1 FM waveform checks and adjustments

1. Connect an oscilloscope to V-RF of the Front service terminal. Trigger the oscilloscope externally with the signal from D. PULSE of the Front service terminal.
2. Play the stairstep signal of the MH-2 Alignment tape.

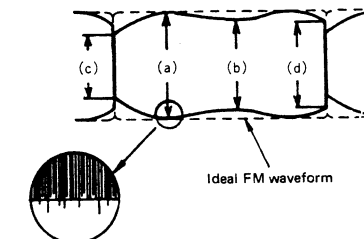


Fig. 2-16 FM waveform (maximum output)

**Note:** If the waveform is serrated, read the output level where the serrations are most closely aligned.

3. Turn the Tracking VR R18 [0] [6] and set for maximum FM output waveform.
4. Adjust the oscilloscope to set the maximum waveform to 4 scale divisions.
5. Confirm that depressions at the drum intake (c) and drum exit (d) exceed 3.0 scale divisions (Fig. 2-16).
6. Confirm that variations at (b), (c) and (d) are greater than 3.4 scale divisions.
7. Turn the Tracking VR R18 [0] [6] to both extremes and confirm that variation of the FM waveform is nearly linear (Fig. 2-17).

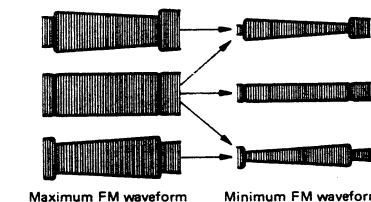


Fig. 2-17 Normal waveform variation



Fig. 2-18 Abnormal waveform variation

8. If variation is distorted, as illustrated in Fig. 2-18, perform audio/control head adjustment. If this is inadequate, proceed to the following steps.
9. Loosen the setscrews of the supply and take-up guide rollers to permit turning.
10. Turn the tracking control to maximum FM waveform output. If the portion at the drum intake appears as shown by (A) in Fig. 2-19, adjust the supply guide roller to obtain a flat waveform as shown by (B).

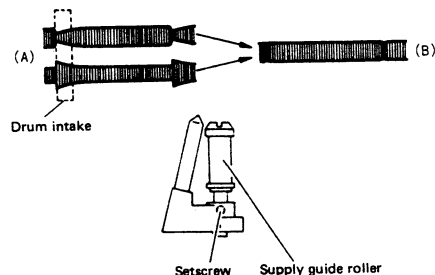


Fig. 2-19 Drum intake waveform adjustment

11. If the portion at the drum exit appears as shown by (C) in Fig. 2-20, adjust the take-up guide roller to obtain a flat waveform as shown by (D).

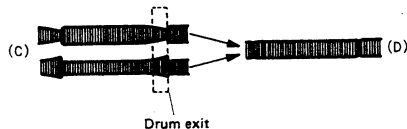


Fig. 2-20 Drum exit waveform adjustment

12. Again confirm absence of tape curling or wrinkling at the impedance roller and take-up guide pole. If abnormality is confirmed at the impedance roller, fine-adjust the impedance roller height. If abnormality is confirmed at the take-up guide pole, adjust the audio/control head inclination (see section 2.8).

13. Turn the tracking control for minimum FM waveform output. If the waveform appears as shown by the examples (A), (B), (C) or (D) of Fig. 2-21, fine-adjust the supply and take-up guide rollers to obtain a waveform as shown by examples (E), (F) and (G).

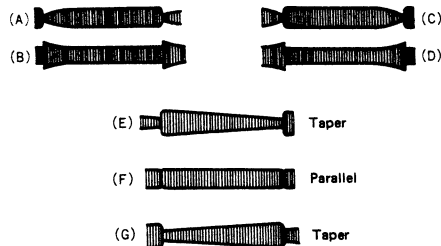


Fig. 2-21 FM waveform at minimum output

Note: If waveform varies, adjust at the point of minimum variation.

#### 2.9.2 Audio/control head parallel

1. As illustrated in Fig. 2-22, set the parallel check plate (PUJ50204) gently against the A/C head take-up guide pole. Confirm that inclination (A) is less than 0.1 mm.
2. Set the flat portion of the check plate gently against the A/C head. Confirm absence of space at top, as shown by (B).

Important: Do not adjust the height or inclination of the take-up guide pole itself.

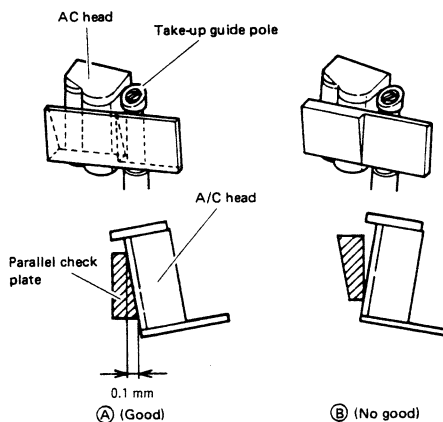


Fig. 2-22 A/C head parallel

#### 2.9.3 Audio head height and azimuth adjustment

If the audio/control head position is incorrect, S/N is impaired during tape playback.

1. Connect AUDIO-1 and AUDIO-2 output signals to CH1 and CH2 of a dual-trace oscilloscope. Refer to section 3.5.
2. Play the 6 kHz (stairstep) signal of the MH-2 Alignment tape.
3. While observing the output signals, turn screw (C) (Fig. 2-24) for maximum waveforms and absence of phase difference (Fig. 2-23).

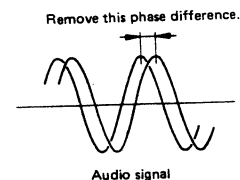


Fig. 2-23 Audio signal phase adjustment

4. Turn screws (A), (B) and (C) by small and equal increments at a time and adjust for maximum audio output. With screw (A) as reference, screw (B) adjusts inclination and screw (C) adjusts azimuth.
5. Gently press the tape upwards and downwards at the A/C head area. Confirm that the level does not increase.

#### Notes:

- 1) In order to avoid damaging the Alignment tape, do not turn screw (A) more than 1/4-turn at a time.
- 2) After adjusting screw (B), be sure to adjust audio azimuth with screw (C).
6. Repeat above steps 3 to 5. Adjust for maximum audio output with minimum variations.

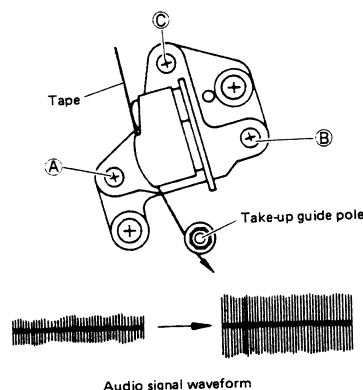


Fig. 2-24 Audio/control head adjustment

#### 2.9.4 Setscrew tightening

1. After confirming normal tape transport, set to the Stop mode and tighten the setscrews.

Note: Use care not to disturb the guide roller adjustments.

2. Again use the MH-2 Alignment tape and perform FM waveform checks.

#### 2.9.5 Control head phase adjustments -1

1. Connect the oscilloscope to V-RF of the Front service terminal. Trigger the oscilloscope externally with the signal from D. PULSE of the Front service terminal.
2. Play the stairstep signal of the MH-2 Alignment tape.
3. Confirm that maximum FM output is obtained at the center detent (AUTO) position of the Tracking VR R18 (0/6). If the maximum is not at center, set the Tracking VR R18 (0/6) to the center and perform the following steps.
4. Loosen screws (D) and (E) (Fig. 2-25) to the degree that allows sliding the A/C head. Slide the A/C head fully toward the capstan direction.
5. Set the A/C head positioning tool (PUJ47351-2) onto screw (E) with the pin of the tool inserted into the hole.
6. Slowly turn the tool to shift the A/C head assembly in the direction shown by the arrow. Set to the point for maximum FM waveform.

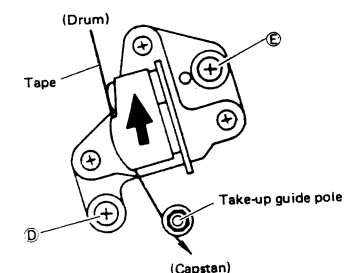


Fig. 2-25 Control head phase adjustment

7. While using care not to disturb the A/C head setting, tighten screws (D) and (E).
8. Turn the Tracking VR and confirm maximum FM waveform at the center detent position.

Note: Tighten screws (D) and (E) so as not to vary the FM waveform.



### 2.9.6 Control head phase adjustments -2

1. Connect a dual-trace oscilloscope to V-RF of the Front service terminal and to CN11 of the AUDIO BOARD **011**.
2. Set the oscilloscope to "Chop" mode and use internal trigger.
3. Loosen screws **D** and **E** to allow sliding the A/C head.
4. Play the MBPE-X alignment tape. Set the Tracking VR R18 **016** to the center detent position.
5. Use the A/C head positioning tool to adjust the head position to align the phases of the audio and FM waveforms. Also adjust for maximum overall FM output.
6. Play the FM AUDIO carrier signal of the MH-F8 alignment tape.
7. Connect the oscilloscope to front A-RF. From the Step 5 position, shift the A/C head to the nearest maximum FM position. Then tighten screws **D** and **E**.
8. Operate the Tracking VR R18 **016** and confirm maximum FM waveform at the center detent position.

**Note:** Contact JVC regarding the MBPE-X alignment tapes.

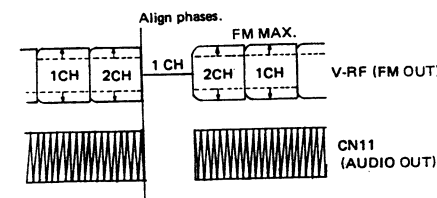


Fig. 2-26

### 2.9.7 Video and FM audio tracking phase check

1. Connect CH1 of a dual-trace oscilloscope to V-RF of the Front service terminal and CH2 to A-RF of the Front service terminal.
2. Play portion (2) (Stairsteps, FM Audio Carrier only) of the MH-F8 Alignment tape.
3. Turn the Tracking VR for maximum audio FM envelope. Set the waveform to 4 scale divisions.
4. Then turn the Tracking VR for maximum video FM.
5. If above waveform control cannot be obtained, the upper drum unit may require replacement.

### 2.9.8 REC/PB FM level checks

1. For FM video, use a mono scope signal input. For FM audio do not apply a signal (but supply a mono scope video input).
2. Adjust the Tracking VR for maximum waveform at
3. If the FM level varies or if there is FM loss, check according to Table 2-2.

Check Item	Check Point	FM level (within)	FM Loss (within)
FM VIDEO	the Front service terminal (V-RF)	3.6 scale div.	3.2 scale div.
FM AUDIO	the Front service terminal (A-RF)	3.6 scale div.	3.2 scale div.

Table 2-2

4. If above waveforms cannot be obtained, the upper drum unit may require replacement.

**Note:** Use tape that has not been damaged for checking.

### 2.9.9 Final checks

1. In the Play mode, inspect each of the shafts, rollers and head section of the transport and confirm absence of tape curling, wrinkling or drifting.
2. Perform servo circuit checks and adjustments (section 3.4).
3. Perform audio circuit checks and adjustments (section 3.5, 3.7).
4. Perform video circuit checks and adjustments (section 3.6, 3.8)

## SECTION 3 ELECTRICAL ADJUSTMENTS

### 3.1 PREPARATION

#### 1. Prior checks

Electrical adjustments of this section are generally required after video heads and consumable mechanical parts were replaced, or, in case of a fault in the electrical circuits. In any case, the first thing needed is to confirm that the objective part is not satisfying the specified value.

2. Regarding parts that have need of complete mechanical adjustments (see section 2) before electrical adjustments, confirm that their mechanical adjustments have been performed correctly.

3. All adjustments and checkup of this model must be performed as all boards are mounted.

4. Don't turn off the power switch without reason while tape is running. This may result in damage of the tape.

5. If any warning message is displayed, turn off the power switch once and remove the cause before proceeding with the work.

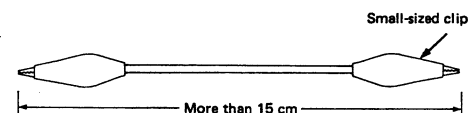
2. In addition to the special equipment, the following test apparatuses are required.

- Frequency counter (sensitive to 10 MHz and over/100 mV and under, high input impedance)
- Video signal generator (1411, Model 410P-JVC or equivalent)
- Waveform monitor (1485R or equivalent)
- Digital voltmeter (readable to 1 mV DC at minimum)
- Sweep signal generator (100 kHz – 10 MHz)
- Oscilloscope (dual-trace, better than 50 MHz)
- TV monitor
- Vectorscope (521A or equivalent)
- Audio tester
- DC Power supply

3. Additional devices for convenience

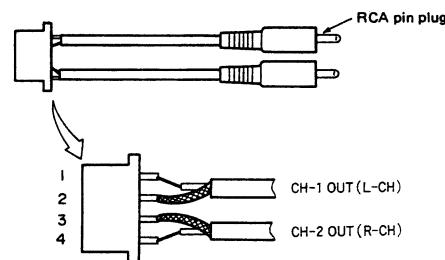
#### 1) Shorting lead

This is recommended to shortcircuit between test pins.



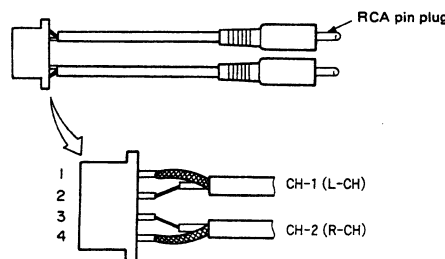
#### 2) Audio output checker

To be used for the AUDIO OUT connectors of the NORMAL AUDIO circuit and the Hi-Fi AUDIO circuit.



#### 3) Bias level checker

To be used for bias level adjustment of the NORMAL AUDIO circuit.



### 4. Contents of alignment tapes

#### • MH-2

No.	PB time	Video signal	Audio signal	Description
1	10 min.	Stairsteps	6 kHz	for check and adjustment of interchangeability for check and adjustment of the servo circuit for adjustment of audio head azimuth
2	5 min.	None	3 kHz	for check of tape speed for check of wow & flutter
3	10 min.	Color bars	1 kHz (0 dB)	for check and adjustment of video signal PB circuits for check and adjustment of audio signal PB circuits
4	3 min.	RF sweep	None	for adjustment of video head resonance and Q (Markers: 2 MHz, 4 MHz, 5 MHz)

Table 3-1 MH-2 specifications

#### • MH-8

No.	PB time	Video signal	Audio signal	Description
1	2 min.	Color sweep	400 Hz (−10 dB)	for check and adjustment of frequency characteristic in video PB circuits
2	2 min.	"	100 Hz (−10 dB)	for check and adjustment of frequency characteristic in audio PB circuits
3	2 min.	"	8 kHz (−10 dB)	
4	4 min.	"	—	

Table 3-2 MH-8 specifications

### 3.2 REQUIRED TEST INSTRUMENTS AND FIXTURES

1. To perform electrical adjustments properly and easily, the special test equipment shown in Fig. 3-1 are needed besides the other instruments and fixtures mentioned below.

If adjustments are performed without them, it takes a long time after repeated trial and error and, moreover, may result in unsatisfactory result in precision and performance.

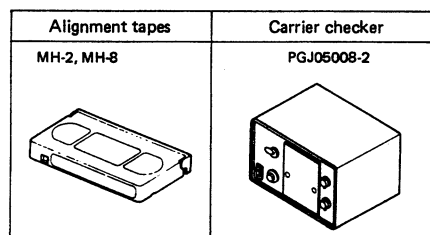
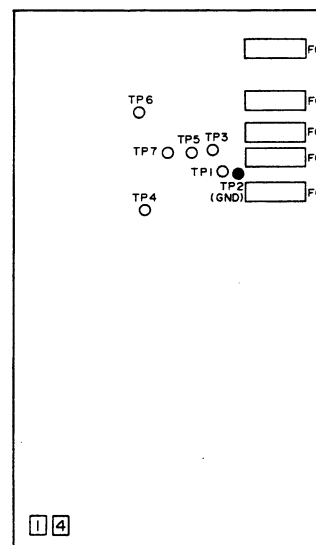


Fig. 3-1 Special test equipment

### 3.3 POWER SUPPLY CIRCUIT

#### • Check of regulator output voltage

POWER 1 4



Measure DC voltage at each test point with a digital voltmeter.

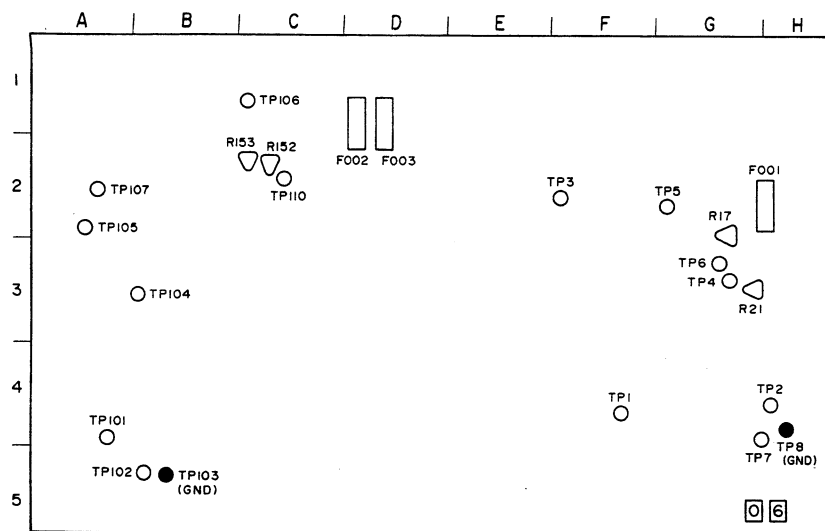
Use TP2 or the bracket of the POWER board for grounding.

Check point	Standard	Mode
TP1	+12.0 ± 0.2 V DC	PB
TP3	+12.0 ± 0.2 V DC	
TP4	+5.0 ± 0.3 V DC	
TP5	+12.0 ± 0.2 V DC	
TP6	+5.0 ± 0.2 V DC	
TP7	+12.0 ± 0.4 V DC	

#### • Check of fuses

Check point	Standard
F01	250 V, 4 A
F02	250 V, 800 mA
F03	250 V, 4 A
F04	250 V, 800 mA
F05	250 V, 1 A

### 3.4 SERVO & FM AUDIO PRE/REC CIRCUIT



#### • DRUM/CAPSTAN SERVO section

TP	1	2	3	4	5	6	7	8
Loc.	F4	H4	F2	G3	G2	G3	G4	H4

R	17	18
Loc.	G2	G3

#### • FM AUDIO PRE/REC section

TP	101	102	103	104	105	106	107	110
Loc.	A4	B5	B5	B3	A2	C1	A2	C2

R	152	153
Loc.	C2	C2

#### • Check of fuses

Check point	Standard
F001	250 V, 500 mA
F002	250 V, 630 mA
F003	250 V, 500 mA

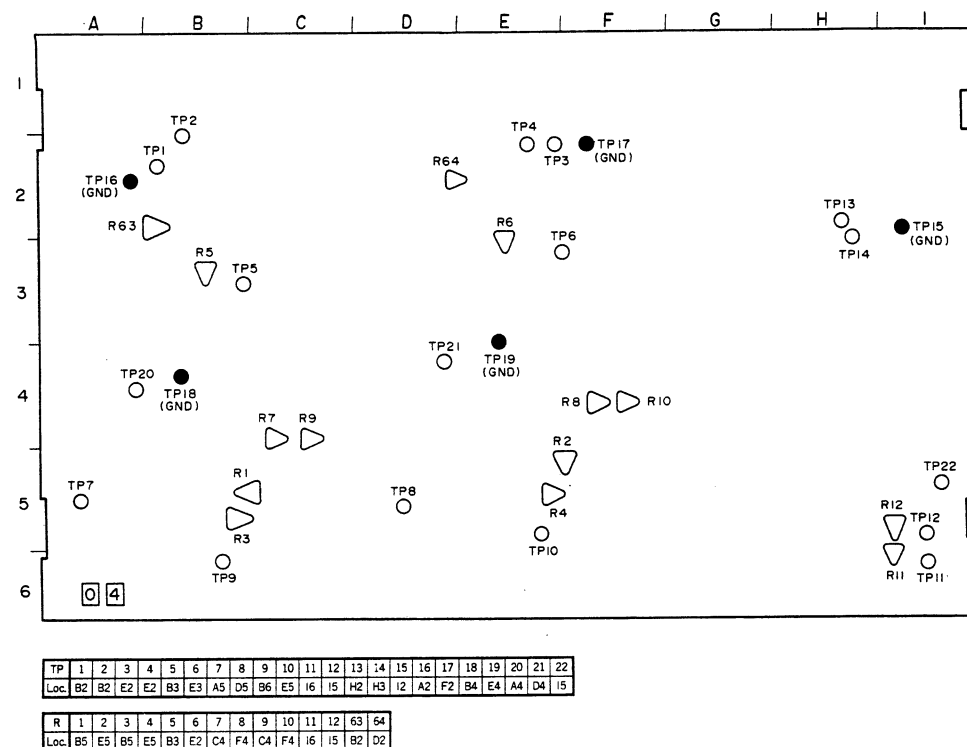
#### • SERVO circuit

Note: Unless otherwise indicated, all test points and adjustment parts are located on the SERVO & FM AUDIO PRE/REC board.

No.	Item	Check Point	Adjustment Parts	Signal	Mode	Description
1	CTL pulse check	TP2	—	MH-2 (Stairstep) Monoscope	PB REC ↓ PB	<ol style="list-style-type: none"> <li>1) Connect an oscilloscope to TP2 and TP5 (D. FF), the latter of which is for external trigger.</li> <li>2) Observing waveform at TP2, confirm that the positive pulse 'a' of the waveform shown on the left is more than 0.5 Vp-p.</li> <li>3) If there is such a noise component as 'b' included, confirm that it is less than 0.1 Vp-p.</li> <li>4) Also confirm relation between time axes of the negative and positive pulses, which should be '<math>t_1 &gt; t_2</math>'.</li> <li>5) Record monoscope signal and play it back.</li> <li>6) In the same manner as the step 2), confirm that 'a' of the playback signal is more than 0.5 Vp-p.</li> </ol>
2	Drum FG/PG	TP1	—	Color bar	REC	<ol style="list-style-type: none"> <li>1) Connect the oscilloscope to TP1 and TP5 (D. FF), the latter of which is for external trigger.</li> <li>2) Observing waveform at TP1, confirm that it meets the following specifications as shown on the left. <ul style="list-style-type: none"> <li>a = more than 4.0 Vp-p</li> <li>b = 2.0 – 2.8 V</li> <li>c = more than 0.5 V</li> <li>t = 5.7 msec</li> </ul> </li> </ol>
3	Capstan FG	TP3	—	Color bar	REC	<ol style="list-style-type: none"> <li>1) Connect the oscilloscope to TP3 and TP5 (D. FF), the latter of which is for external trigger.</li> <li>2) Observing waveform at TP3, confirm that it meets the following specifications as shown on the left. <ul style="list-style-type: none"> <li>a = more than 4.5 Vp-p</li> <li>b = less than 0.5 V</li> <li>t = 1.97 – 1.99 msec</li> </ul> </li> </ol>

No.	Item	Check Point	Adjustment Parts	Signal	Mode	Description
4	Tracking preset	TP6 TP7	—	Color bar	REC	1) Connect an oscilloscope of dual-trace type to TP6 (CH-1) and TP7 (CH-2). 2) Set R18 (TRACKING VR) to its center detent position. 3) Record the color bar signal with internal trigger from TP7. 4) Observe waveforms at TP7 and TP6, and make a note of the time lag 't <sub>1</sub> ' between TP7's fall point and TP6's V. sync.
		TP6 TP4	R21	Color bar	REC ↓ PB	5) Connect the oscilloscope's CH-2 probe to TP4. 6) Play back the section recorded in the step 3) with internal trigger from TP4. 7) Observe waveforms at TP4 and TP6 and adjust R21 so that the time lag 't <sub>2</sub> ' between TP4's fall point and TP6's V. sync becomes equal to 't <sub>1</sub> ' measured in the step 4) above. $t_1 = t_2$
5	PB SW point	—	R17	—	—	Note: • R17 of the SERVO & FM AUDIO PRE/REC board [06] is available for PB switching point adjustment, however, this model has no PB circuit because it is designed for the exclusive use of recording. • Do not adjust R17 except the following case. • If there is dropout in FM waveform after the drum is replaced, mark the setting position of R17 first and then subtly turn it clockwise or counterclockwise to output FM waveform correctly. • To adjust R17: 1) Play back the alignment tape by a standard playback machine* to confirm that the PB switching point is correctly adjusted. 2) Use the same playback machine to play back a tape recorded by BR-7030U, and adjust R17 for the correct switching point. * Standard playback machine: For example, BR-7000ERA, BR-6600E, etc. which are completely adjusted.

### 3.5 NORMAL AUDIO CIRCUIT



#### Note:

- Unless otherwise indicated, all check points and adjusting parts are located on the NORMAL AUDIO board.
- Unless otherwise directed, perform checks and adjustments with switches being initialized as shown below.

#### Switches on the rear side

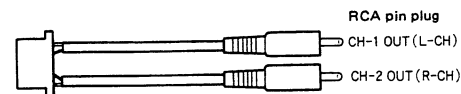
Hi-Fi RECSW	: OFF
AUDIO LIMITER SW	: OFF
DOLBY NR SW	: OFF
AGC SW	: ON
EXT CODE SW	: OFF
AUDIO INPUT SELECT SW	: SEPA

#### Switches on the front side

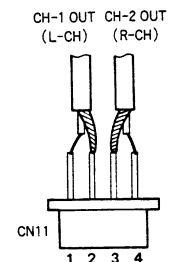
METER SELECT SW	: Hi-Fi (L)
TEST POINT SELECT SW	: A
DIRECTION SW	: ►

- When any of the above switch was set to another position, make sure to return it to the initial setting every time adjustment/check of an item is completed.
- If there is no specification of a tape to use, perform adjustment/check with a VHS (T-120) tape.
- 0 dBs = 0.775 V R.M.S. = 2.19 Vp-p

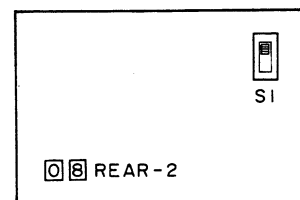
- For adjustment of the NORMAL AUDIO circuit, AUDIO output can be obtained from CN11 (see 3.7) of the AUDIO board **0 1**.
- Connect an audio tester to CN11 together with the audio output checker.



In case no audio output checker is used, connect an audio tester to CN11 as shown below.



- To change normal audio output by the mechanism unit, set S1 of the REAR-2 board **0 8** to the upper position (for the mechanism unit A), to the center position (for the mechanism unit B), and to the lower position (for the mechanism unit C) for respective output from CN11.

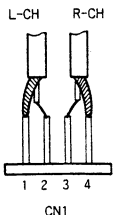




● AUDIO circuit

Note: Unless otherwise indicated, all test points and adjustment parts are located on the NORMAL AUDIO board.

Note: Unless otherwise indicated, all test points and adjustment parts are located on the NORMAL AUDIO BOARD.

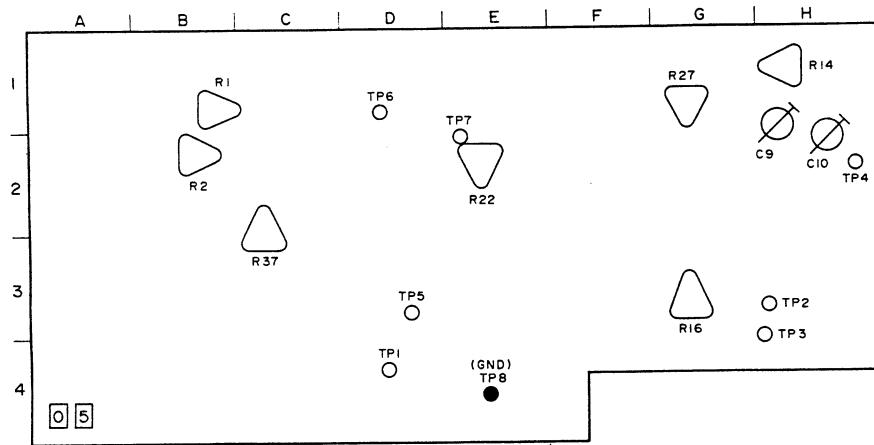
No.	Item	Check Point	Adjustment Parts	Signal	Mode	Description						
1	N. audio E-E level	TP3 (L-ch) TP4 (R-ch) ↓ Audio tester	R63 (L-ch) R64 (R-ch)  -6.0 dBs	1kHz/-6 dBs (AUDIO IN)	E-E	1) Disconnect the wire of CN4 (4-Pin connector). 2) Adjust R63 (R64) so that signal level at TP3 (TP4) of CN11 becomes -6.0 dBs on L (R) channel. 3) Connect the CN4.						
2	Limiter	CN11 Pin 1 (L-ch) Pin 2 (GND) Pin 4 (R-ch) Pin 3 (GND) 0 1 ↓ Audio tester	-	1kHz/+4 dBs (AUDIO IN)	E-E	1) Change the initial setting of the following switches. AUDIO LIMITER SW : ON 2) Confirm that level at pin 1 (pin 4) of CN11 is $-2.0 \pm 1.5$ dBs on L(R) channel.						
3	N. audio PB frequency response	CN11 Pin 1 (L-ch) Pin 2 (GND) Pin 4 (R-ch) Pin 3 (GND) 0 1 ↓ Audio tester	R1 (L-ch) R2 (R-ch)	MH-8 400 Hz 100 Hz 8 kHz	PB	1) Change the initial setting of the following switches. DOLBY NR SW : OFF 2) Play back the 400 Hz segment of the alignment tape MH-8, and measure the output level of pin 1 (pin 4) of CN11 to set it as the reference level (0 dB). 3) Play back the 100 Hz segment of the MH-8 tape and confirm the output level of $-0.5 \pm 2.0$ dB. 4) Next, play back the 8 kHz segment of the MH-8 tape and adjust R1 (R2) to obtain 0 dB as the output level on L (R) channel.						
		<table> <tr> <td>400 Hz</td><td>100 Hz</td><td>8 kHz</td></tr> <tr> <td>0 dB (Reference)</td><td><math>-0.5 \pm 2.0</math> dB</td><td>0 dB</td></tr> </table>		400 Hz	100 Hz	8 kHz	0 dB (Reference)	$-0.5 \pm 2.0$ dB	0 dB			
400 Hz	100 Hz	8 kHz										
0 dB (Reference)	$-0.5 \pm 2.0$ dB	0 dB										
4	N. audio PB level	CN11 Pin 1 (L-ch) Pin 2 (GND) Pin 4 (R-ch) Pin 3 (GND) 0 1 ↓ Audio tester	R3 (L-ch) R4 (R-ch)  PB level : -8.0 dBs	MH-2 1 kHz	PB	1) Playing back the 1 kHz segment of the alignment tape MH-2, adjust R3 (R4) to obtain -8.0 dBs as the output level on L(R) channel.						
5	Full erase voltage Bias frequency	TP22  TP11	-	No signal	REC	1) Connect the oscilloscope to TP22. 2) Confirm that erase voltage is $90 \pm 5$ Vp-p. 3) Connect the oscilloscope or an frequency counter to TP11. 4) Confirm that the frequency is $70 \pm 5$ kHz (13.3 to 15.4 $\mu$ sec).						

No.	Item	Check Point	Adjustment Parts	Signal	Mode	Description
6	Bias level	CN1 Pin 2 (L-ch) Pin 1 (GND) Pin 3 (R-ch) Pin 4 (GND) ③ ⑤ ↓ Audio tester	R11 (L-ch) R12 (R-ch)	No signal	REC	1) Connect the audio tester's (+) terminal to pin 2(pin 3) of CN1 while its (−) terminal to pin 1(pin 4) of CN1. 2) Adjust R11 (R12) to obtain 3.5 mV rms as bias level on L(R) channel.  <div style="border: 1px solid black; padding: 2px; width: fit-content; margin: 10px auto;">Bias level : 3.5 mV rms</div> <p>Note: In case no bias level checker is used, connect the audio tester to CN1 of the A/C HEAD board [35] as shown below.</p> 
7	N. audio REC/PB level	CN11 Pin 1 (L-ch) Pin 2 (GND) Pin 4 (R-ch) Pin 3 (GND) ① ① ↓ Audio tester	R5 (L-ch) R6 (R-ch)	1 kHz/−6 dBs (AUDIO IN)	REC ↓ PB	1) Change the initial setting of the following switch. DOLBY NR SW : OFF 2) Record a 1 kHz/−6 dBs signal and play it back. 3) With the signal being played back, confirm that the PB level is $-6.0 \pm 0.3$ dBs on L and R channels respectively. If not, check up the previous item No. 4 again. 4) When the PB level of the above step 2) is different from the standard, repeat the above step 2) and adjust R5 (for L-ch)/R6 (for R-ch) to obtain $-6.0 \pm 0.3$ dBs both in REC and PB.  <div style="border: 1px solid black; padding: 2px; width: fit-content; margin: 10px auto;">REC/PB level : <math>-6.0 \pm 0.3</math> dBs</div>

No.	Item	Check Point	Adjustment Parts	Signal	Mode	Description										
8	N. audio REC/PB frequency response	CN11 Pin 1 (L-ch) Pin 2 (GND) Pin 4 (R-ch) Pin 3 (GND) ① ① ↓ Audio tester	—	1 kHz/ −26 dBs 8 kHz/ −26 dBs (AUDIO IN)	REC ↓ PB	1) Record 1 kHz/−26 dBs and 8 kHz/−26 dBs signals with the following switch setting. DOLBY NR SW : OFF 2) Referring to the PB level of the 1 kHz signal as the reference (0 dB), confirm that the PB level of the 8 kHz signal satisfies the specifications shown on the left. 3) If anything differs from the specifications, repeat the adjustment as follows. a) When PB level of the 8 kHz signal is higher than the specifications, raise the bias level (Item No. 6). (4.0 mV rms at maximum) b) When PB level of the 8 kHz signal is lower than the specifications, decrease the bias level (Item No. 6). (3.0 mV rms at minimum) 4) Repeat the adjustments of the above steps 1) through 3) until all of the items satisfy the specifications.										
		<table><tr><td rowspan="2">REC/PB frequency response</td><td>1 kHz</td><td>8 kHz</td></tr><tr><td>0 dB (Reference)</td><td>0 ± 0.3 dB</td></tr></table>			REC/PB frequency response	1 kHz	8 kHz	0 dB (Reference)	0 ± 0.3 dB							
		REC/PB frequency response	1 kHz	8 kHz												
			0 dB (Reference)	0 ± 0.3 dB												
		CN11 Pin 1 (L-ch) Pin 2 (GND) Pin 4 (R-ch) Pin 3 (GND) ① ① ↓ Audio tester	R7 (L-ch) R8 (R-ch)	40 Hz/ −26 dBs 100 Hz/ −26 dBs 1 kHz/ −26 dBs 12 kHz/ −26 dBs (AUDIO IN)	REC ↓ PB	5) Change the switch setting as follows. DOLBY NR SW : ON 6) Record the 40 Hz, 100 Hz, 1 kHz, 12 kHz/−26 dBs signals and play them back. 7) Referring to the PB level of the 1 kHz signal as the reference (0 dB), respective PB levels of the 40 Hz, 100 Hz and 12 kHz signals satisfy the specifications shown on the left. 8) If the level of the 12 kHz signal differs from the specifications, adjust R7 and R8 to obtain 0 ± 0.5 dB both on L and R channels.										
		<table><tr><td>REC/PB frequency response</td><td>40 Hz</td><td>100 Hz</td><td>1 kHz</td><td>12 kHz</td></tr><tr><td></td><td>−2.0 ± 3.0 dB</td><td>0 ± 2.5 dB</td><td>0 dB (Reference)</td><td>0 ± 0.5 dB</td></tr></table>			REC/PB frequency response	40 Hz	100 Hz	1 kHz	12 kHz		−2.0 ± 3.0 dB	0 ± 2.5 dB	0 dB (Reference)	0 ± 0.5 dB		
REC/PB frequency response	40 Hz	100 Hz	1 kHz	12 kHz												
	−2.0 ± 3.0 dB	0 ± 2.5 dB	0 dB (Reference)	0 ± 0.5 dB												
9	FM audio REC FM level	TP102 TP103 (GND) ① ②	R153 (L-ch) R152 (R-ch) ① ②	No signal	REC	1) Change the initial setting of the following switch. Hi-Fi REC SW : ON 2) Set the oscilloscope as follows. V : 20 mV/div., H : 0.5 μsec/div. 3) Turn R153 and R152 clockwise to the respective full extent (being viewed from the parts side). 4) Adjust R153 so that the level of the 1.4 MHz waveform becomes 40 mVp-p. 5) Next, adjust R152 to obtain 130 mVp-p as the level of the mixed waveform (1.4 MHz and 1.8 MHz).										
		 														

### 3.6 VIDEO PRE/REC CIRCUIT

- Locations of test points and VRs on the VIDEO PRE/REC board (pattern side)



TP	1	2	3	4	5	6	7	8
Loc.	D1	H3	H3	H2	D3	D1	E2	E4

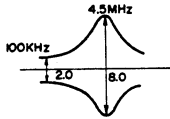
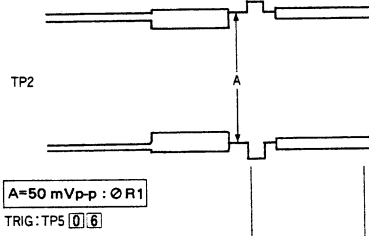
R	1	2	14	16	22	27	37
Loc.	B1	B2	H1	G3	E2	G1	C3

C	9	10
Loc.	H1	H2

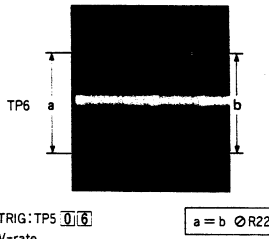
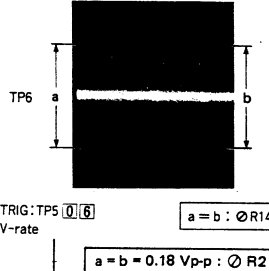
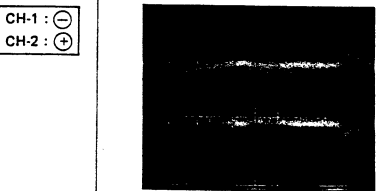
### • VIDEO PRE/REC CIRCUIT

Note: Make sure to start adjustment of the video circuit 5 minutes after the power was turned on.  
Unless otherwise indicated, all test points and adjustment parts are located on the VIDEO PRE/REC board.

Unless otherwise indicated, all test points are at the component pins.

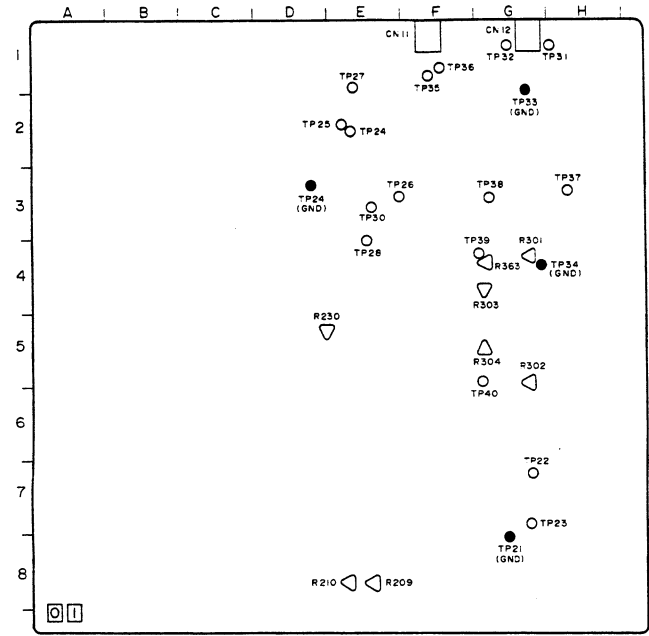
No.	Item	Check Point	Adjustment Parts	Signal	Mode	Description												
1	Head resonance & Q	TP5	C9 C10 R27 R16	Sweep input TP2 (CH-1) TP3 (CH-2)	PB	<ol style="list-style-type: none"> <li>1) Connect the oscilloscope to TP5.</li> <li>2) Supply a sweeper's output to TP2 (CH-1).</li> <li>3) Set the mode to PLAY with a blank (not yet used) cassette tape.</li> <li>4) Adjust C9 so that <math>F_0 = 4.5</math> MHz.</li> <li>5) Set the 100 kHz level to be 2 scale divisions on the oscilloscope, and then adjust R27 so that the 4.5 MHz level (Q) becomes 8 scale divisions.</li> <li>6) In the same manner as above, supply the sweeper's output to TP3 for CH-2 adjustment.</li> </ol> <p><b>Note:</b></p> <ul style="list-style-type: none"> <li>This adjustment is required after replacing the drum assembly and upper drum assembly.</li> <li>The sweeper's output level should be adjusted to 0.25 Vp-p approx. for the 1 MHz level at TP5 in advance.</li> <li>If trigger output is available from the sweep generator, trigger the oscilloscope with it.</li> </ul>												
		 <p>Q <math>\phi</math> R27(R16) Fo <math>\phi</math> C9 (C10)</p> <table border="1"> <thead> <tr> <th></th><th>Signal IN</th><th>F<sub>0</sub></th><th>Q</th></tr> </thead> <tbody> <tr> <td>CH-1</td><td>TP2</td><td>C9</td><td>R27</td></tr> <tr> <td>CH-2</td><td>TP3</td><td>C10</td><td>R16</td></tr> </tbody> </table>		Signal IN	F <sub>0</sub>	Q	CH-1	TP2	C9	R27	CH-2	TP3	C10	R16				
	Signal IN	F <sub>0</sub>	Q															
CH-1	TP2	C9	R27															
CH-2	TP3	C10	R16															
2	REC FM level	TP2	R1	Color bar	REC	<ol style="list-style-type: none"> <li>1) Connect the oscilloscope to TP5[06] for external trigger.</li> <li>2) Adjust R1 so that the pedestal level (A) becomes 50 mVp-p at TP2.</li> </ol>												
		 <p>A=50 mVp-p : <math>\phi</math> R1 TRIG: TP5 [0] [6]</p>																
		TP106 [0] [6]		Color bar	REC ↓ PB	<ol style="list-style-type: none"> <li>3) Confirm that the level of FM waveform is more than 76 mVp-p at TP106.</li> <li><b>Note:</b> If there is level difference between channels, measure the smaller level. (CN103 [0] [6] must be open-circuit for this checkup.)</li> <li>4) If the level is out of the specifications, re-adjust the pedestal level to be 46 mVp-p at TP2 in the same manner as the step 2).</li> <li>5) Again, confirm the value of the step 3).</li> </ol>												



No.	Item	Check Point	Adjustment Parts	Signal	Mode	Description
3	PB color channel difference & color level	TP6	R22 R37	MH-2 (Color bar)	PB	<ol style="list-style-type: none"> <li>1) Play back the color bar signal of the alignment tape MH-2.</li> <li>2) Connect the oscilloscope to TP5 [06] for external trigger.</li> <li>3) Adjust R22 so that CH-1 and CH-2 are the same in the chroma level.</li> <li>4) At that time, adjust R37 to obtain <math>0.20 \pm 0.01</math> Vp-p as the chroma level.</li> </ol>
 <p>TRIG: TP5 [0] [6] V-rate</p> <p><math>a = b \pm 0.22</math></p>						
4	REC/PB color channel difference & color level	TP6	R14 R2	Color bar	REC ↓ PB	<ol style="list-style-type: none"> <li>1) Connect the oscilloscope to TP5 [06] for external trigger.</li> <li>2) Set the TRACKING VR to its center detent position.</li> <li>3) Record the color bar signal and play it back.</li> <li>4) Adjust R14 so that levels of CH1 and CH2 become equal to each other.</li> <li>5) While repeating the recording and playback, adjust R2 so that TP6's level is <math>0.18 \pm 0.01</math> Vp-p. (At this adjustment, set the TRACKING VR to the center detent position.)</li> </ol> <p>Note: With the TRACKING VR set to the center detent position, the maximum FM waveform should be obtained. If not, adjust the phase of the CTL head (Sect. 2.9.6).</p>
 <p>TRIG: TP5 [0] [6] V-rate</p> <p><math>a = b \pm 0.14</math></p> <p><math>a = b = 0.18 \text{ Vp-p} \pm 0.02</math></p>						
5	PB frequency response & channel difference	TP5	R16 R27	MH-8	PB	<ol style="list-style-type: none"> <li>1) Connect the oscilloscope to TP5 [06] for external trigger.</li> <li>2) Set the TRACKING VR to its center detent position.</li> <li>3) Confirm no difference in the 2 MHz level at between the two channels.</li> <li>4) If the level of CH-1 (CH-2) is bigger, adjust R27 (R16).</li> </ol>
 <p>CH-1 : ⊖ CH-2 : ⊕</p>						

3.7 AUDIO CIRCUIT (Hi Fi)


- Locations of test points and VRs on the AUDIO board (parts side)

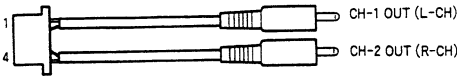


TP	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Loc	G8	G7	G7	D3	E2	E3	E1	E4	E2	E3	H1	G1	G1	G4	F1	F1	H3	G3	G4	G5

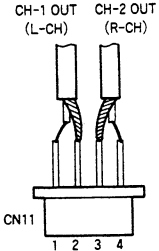
R	209	210	230	302	303	304	363
Loc	E8	E8	D5	G5	G4	G5	G4


CN	11	12
Loc	F1	G1

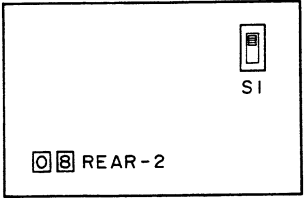
- For adjustment of the Hi-Fi AUDIO circuit, NORMAL AUDIO output can be obtained from CN11 while Hi-Fi AUDIC output can be obtained from TP37 and TP38 of the AUDIO board . Connect an audio tester to CN11 together with the audio output checker.



In case no audio output checker is used, connect an audio tester to CN11 as shown below.



- To change normal audio output by the mechanism unit, set S1 of the REAR-2 board  to the upper position (for the mechanism unit A), to the center position (for the mechanism unit B), and to the lower position (for the mechanism unit C) for respective output from CN11.



- Note:
- Unless otherwise indicated, all check points and adjusting parts are located on the AUDIO board.
  - Unless otherwise directed, perform checks and adjustments with switches being initialized as shown below.

Switches on the rear side	
HI-FI REC SW	: ON
AUDIO LIMITER SW	: OFF
DOLBY NR SW	: OFF
AGC SW	: ON
EXT CODE SW	: OFF
AUDIO INPUT SELECT SW	: SEPA

Switches on the front side	
METER SELECT SW	: Hi-Fi (L)
TEST POINT SELECT SW	: A
DIRECTION SW	: ▶

- When any of the above switch was set to another position, make sure to return it to the initial setting every time adjustment/check of an item is completed.
- If there is no specification of a tape to use, perform adjustment/check with a VHS (T-120) tape.
- 0 dBs = 0.775 V R.M.S. = 2.19 Vp-p

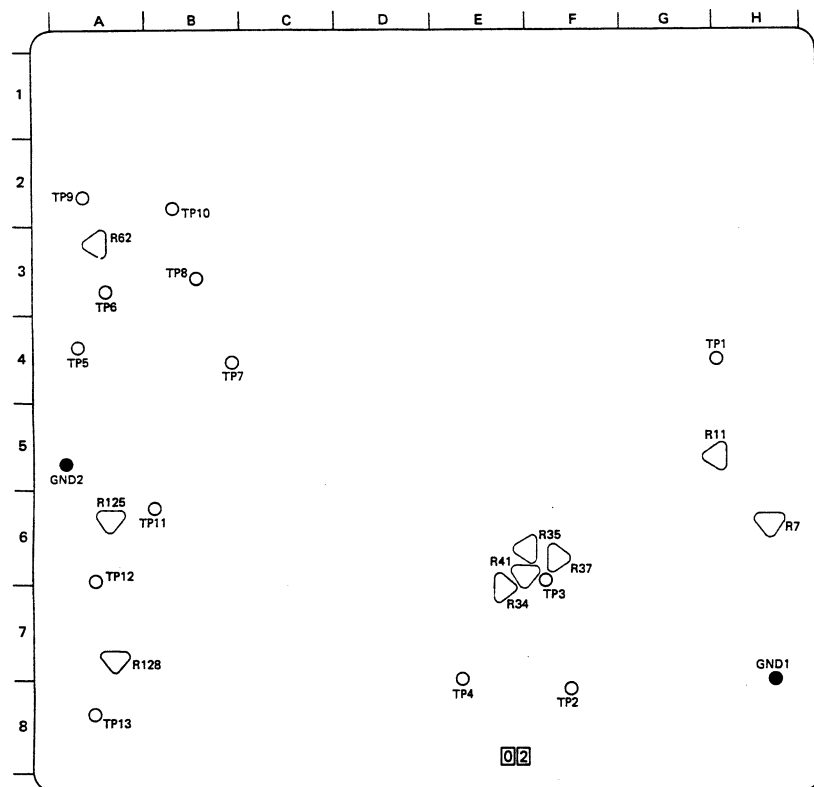
No.	Item	Check Point	Adjustment Parts	Signal	Mode	Description
1	Audio level Margin check VR setting	TP37 (L-ch) TP38 (R-ch) ↓ Audio tester  CN11 Pin 1 (L-ch) Pin 2 (GND) Pin 4 (R-ch) Pin 3 (GND) ↓ Audio tester  Note: Proceed to the following items as the AUDIO REC LEVEL VR is set in this item.	Hi-Fi REC LEVEL VR  NORMAL REC LEVEL VR	1kHz/-6 dBs (Hi-Fi AUDIO IN)  1kHz/-6 dBs (AUDIO IN)	E-E	1) Turn the Hi-Fi REC LEVEL VR fully clockwise, and confirm that signal level at TP37 (TP38) is $-6.0 \pm 1.5$ dBs on L (R) channel. 2) Change the switch setting as follows. Hi-Fi REC SW : OFF 3) Turn the NORMAL REC LEVEL VR fully clockwise, and confirm that signal at pin 1 (pin 4) of CN11 is $+8.0 \pm 1.5$ dBs on L (R) channel. 4) After the level confirmation, adjust the NORMAL REC LEVEL VR to obtain $-6.0$ dBs at pin 1 and pin 4 of CN11 for both channels.
2	Audio level meter	TP37 (L-ch) TP38 (R-ch) ↓ Audio tester  Audio level meter	Hi-Fi REC LEVEL VRs (L- and R-ch)  R230	1kHz/-6 dBs (Hi-Fi AUDIO IN)	E-E	1) Adjust both the Hi-Fi REC LEVEL VRs so that outputs at TP37 and TP38 are $-20$ dBs respectively. 2) The audio level meter being viewed from the front, adjust R230 so that the meter reads 0 VU.
3	FM audio REC FM level	TP39 (L-ch) TP40 (R-ch)	R363 (L-ch) R362 (R-ch)	No signal	REC	1) Hi-Fi REC SW : ON. 2) Connect the oscilloscope to TP39 (TP40) and adjust R363 (R362) to obtain 0.6 Vp-p on L (R) channel.
4	FM audio carrier frequency	TP109 (L-ch) TP110 (R-ch) ① ② ↓ Frequency counter	R303 (L-ch) R304 (R-ch)	No signal	REC	1) Adjust R303 so that frequency at TP109 is $1.400 \begin{smallmatrix} +0.000 \\ -0.005 \end{smallmatrix}$ MHz. 2) Adjust R304 so that frequency at TP110 is $1.800 \begin{smallmatrix} +0.000 \\ -0.005 \end{smallmatrix}$ MHz.

L-ch carrier freq. : $\phi$ R303	$1.400 \begin{smallmatrix} +0.000 \\ -0.005 \end{smallmatrix}$ MHz
R-ch carrier freq. : $\phi$ R304	$1.800 \begin{smallmatrix} +0.000 \\ -0.005 \end{smallmatrix}$ MHz

No.	Item	Check Point	Adjustment Parts	Signal	Mode	Description
5	FM audio REC/PB level	Standard playback deck	R301 (L-ch) R302 (R-ch)	1 kHz/—6 dBs (Hi-Fi AUDIO IN)	REC  PB	<p>1) Use the mechanism unit A to record the 1 kHz/—6 dBs signal.</p> <p>2) With a standard playback deck, play back the section recorded in the step 1) and confirm the PB level of <math>-6.0 \pm 0.5</math> dBs.</p> <p>3) If the level is out of the specifications, adjust R301 (R302) subtly and then repeat the above steps 1) and 2).</p> <p>Note: Before turning R301 (R302), mark the present position for a convenience of resetting if it is turned too much.</p> <p>4) Repeat the above steps 1) through 3) until all items meet the specifications.</p> <p>5) In the same manner as above, use the mechanism units B and C to record the signal, and then play it back by the standard playback deck to confirm that the PB level is <math>-6.0 \pm 0.8</math> dBs (level difference between channels must be within 0.5 dB) in the both mechanism units.</p>
		<p>• Standard playback machine: Use an appliance which is completely adjusted, since adjusting levels are checked up by its playback circuit. (BR-7000ERA, BR-6600E, etc. for example)</p>				
6	N. audio PB level	<p>Lead of R101 (R103 side) (L-ch) Lead of R100 (R102 side) (R-ch) ⑩ ④ ↓ Audio tester</p> <p>CN11 Pin 1 (L-ch) Pin 2 (GND) Pin 4 (R-ch) Pin 3 (GND) ⑩ ① ↓ Audio tester</p>	—      R209 (L-ch) R210 (R-ch)	MH-2 1 kHz	PB	<p>1) Confirm that levels at the check points are <math>-8.0 \pm 0.5</math> dBs respectively.</p> <p>2) If there is a difference in either level, repeat the item 3.4.4.</p> <p>3) Adjust R209 (R210) so that PB level at pin 1 (pin 4) of CN11 is <math>-8.0</math> dBs.</p>

### 3.8 VIDEO CIRCUIT

• Locations of test points and VRs on the VIDEO board (pattern side).



TP	1	2	3	4	5	6	7	8	9	10	11	12	13
Loc.	H4	F8	F6	E7	A4	A3	B4	B3	A2	B2	B6	A6	A8

R	7	11	34	35	37	41	62	125	128
Loc.	H6	H5	E7	F6	F6	E6	A3	A6	A7

#### Note:

- Make sure to start adjustment of the VIDEO circuit 5 minutes after the power was turned on.
- Unless otherwise indicated, test points and adjustment parts are located on the VIDEO board.
- Unless otherwise directed, perform checks and adjustments with switches being initialized as shown below.

#### Switches on the rear side

Hi-Fi REC SW	: OFF
AUDIO LIMITER SW	: OFF
DOLBY NR SW	: OFF
AGC SW	: ON
EXT CODE SW	: OFF
AUDIO INPUT SELECT SW	: SEPA

#### Switches on the front side

METER SELECT SW	: Hi-Fi (L)
TEST POINT SELECT SW	: A
DIRECTION SW	: ►

- When any of the above switch was set to another position, make sure to return it to the initial setting every time adjustment/check of an item is completed.
- If there is no specification of a tape to use, perform adjustment/check with a VHS (T-120) tape.
- 0 dBs = 0.775 V R.M.S. = 2.19 Vp-p

### • VIDEO circuit

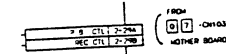
No.	Item	Check Point	Adjustment Parts	Signal	Mode	Description
1	AGC level	TP1	R7 R11	Color bar	E-E	<p>1) Adjust R7 so that Y level (between the sync tip and 100% white) at TP1 becomes 1.0 Vp-p.</p> <p>2) Change the initial setting of the AGC switch, namely, AGC SW : OFF</p> <p>3) Adjust R11 so that Y level (between the sync tip and 100% white) at TP1 becomes 1.0 Vp-p.</p>
2	Carrier & deviation	TP4	R37 R41	Color bar	E-E	<p>Note: This adjustment needs a carrier checker (PGJ05008-2)</p> <p>1) Set up a carrier checker and oscilloscope as shown in the left figure.</p> <p>2) Connect the carrier checker to TP4 with a 10 : 1 probe, and set the carrier checker's switch to "CARRI."</p> <p>3) Adjust R37 so that the sync tip coincides with the lower marker.</p> <p>4) Following the above adjustment, adjust R41 so that the 100% white section coincides with the upper marker (DEVIATION marker).</p>
3	White & dark clip	TP3	R34 R35	Pulse & Bar	E-E	<p>1) Connect the oscilloscope to TP3 and adjust the gain control of the oscilloscope so that the level between the sync tip and the 100% white becomes 4.0 scale divisions on the oscilloscope screen.</p> <p>2) Observing the oscilloscope, adjust R34 so that the white clip (A) becomes 3.6 scale divisions (90%), while adjust R35 so that the dark clip (B) becomes 2.0 scale divisions (50%).</p>

## SECTION 4 DIAGRAMS AND CIRCUIT BOARDS

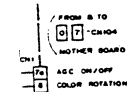
No.	Item	Check Point	Adjustment Parts	Signal	Mode	Description
4	VCO	TP10	R62	No signal	E-E	1) Supply $2.5 \pm 0.01$ V DC to between TP9 and GND. 2) Adjust R62 so that frequency at TP10 is $5.150 \text{ MHz} \pm 5 \text{ kHz}$ . 3) Disconnect the external power supply.
			TP10	$5.150 \text{ MHz} \pm 5 \text{ kHz}$		
5	FM level	TP13	R128	Color bar	E-E	1) Connect the oscilloscope to TP1 for external trigger. 2) Adjust R128 so that the pedestal level of TP13 signal becomes $0.7 \pm 0.02$ Vp-p.
		TP13				
		TRIG: TP1 V-rate		A = $0.7 \text{ Vp-p} : \phi R128$		
6	Color level	TP12	R125	Color bar	PB	1) Connect the oscilloscope to TP1 for external trigger. 2) Adjust R125 so that the chroma level of TP12 signal becomes $0.3 \pm 0.01$ Vp-p.
		TP12 : $0.3 \text{ Vp-p} \phi R125$				

### ■ FOREWORD

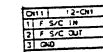
- Expression of connector  
Connector is expressed in three ways.  
1) The following illustrates "CN2 pin 29A and pin 29B" for example.



- The following illustrates "CN1 pin 7a and pin 8".



- Expression of connectors in the overall wiring diagram and the Mother board circuit diagram.



The following illustrates "CN11 pin 1, pin 2 and pin 3".

- Expression of wiring  
As the following circuit diagram is divided to print on two sheets.

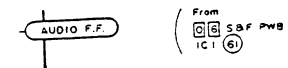
- Circuit diagram divided into two sections:

Board No.	Board Name	Circuit Name
0 6	SERVO & FM AUDIO PRE/REC	SERVO FM AUDIO PRE/REC

- The Servo & FM Audio Pre/Rec board includes the Servo circuit and the FM Audio Pre/Rec circuit. When these two circuits are connected on the board, the circuit diagram expresses them as shown below.

(Example)

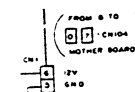
On the diagram of FM AUDIO PRE/REC section, such an indication as the following is found on the AUDIO FF signal line.



In the above case, the end of the wiring is connected to the AUDIO FF on the SERVO section of the diagram.

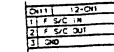
- Wiring of connector

- 



In the above example, CN1 is connected with CN104 on 07 MOTHER board.

- Wiring of connectors in the overall wiring diagram and the Mother board circuit diagram.



In the above example, CN11 is connected with CN1 on 12 FRONT-2 (REMOTE JACK) board.

- Signal flow on the diagram  
The following arrow marks indicate the specified signal paths respectively.

- ➡ : RECORDING or E-E SIGNAL PATH
- ⇨ : PLAYBACK SIGNAL PATH
- ⇩ : REC/PLAY SIGNAL PATH

- Measurement of voltage and waveform

- Voltage  
Measured by digital voltmeter in REC mode.

- Waveform  
VIDEO: Unless otherwise indicated, (a) color bars signal input through LINE IN terminal in REC, (b) color bars signal in PB.

AUDIO: (a) 1 kHz/−6 dBs sine wave in REC, (b) 1 kHz in PB.

**Note:** Indicated voltages were measured as directly at respective pins of semiconductors and connectors as possible, however, some voltages were measured at the nearest parts to the specified measuring points because they were hard of access.  
For details, refer to the list of voltage check points and respective measuring points shown in red ink on circuit diagrams.

- Unit of value

Unless otherwise specified:

- Resistance is in  $\Omega$  (1/6 W, 1/8 W)
- Capacitance in  $\mu\text{F}$
- Inductance in  $\mu\text{H}$
- All diodes are 1SS133
- Screened parts (in **red**) are important for safety assurance. When replacing them, use specified parts.

#### 4.1 KEY TO ABBREVIATIONS

<b>A</b>	<b>ACC</b>	: Automatic Color Control
	<b>ADD</b>	: Adder
	<b>ADC</b>	: Analog to Digital Converter
	<b>ADJ</b>	: Adjustment
	<b>A DUB</b>	: Audio Dubbing
	<b>AE</b>	: Audio Erase
	<b>AEF</b>	: Automatic Edition Function
	<b>AFC</b>	: Automatic Frequency Control
	<b>AFT</b>	: Automatic Fine Tuning
	<b>AGC</b>	: Automatic Gain Control
	<b>AH</b>	: Audio Head
	<b>AL</b>	: After Loading
	<b>ALC</b>	: Automatic Level Control
	<b>ALM</b>	: Alarm
	<b>AM</b>	: Amplitude Modulation
	<b>AMP</b>	: Amplifier
	<b>ANT</b>	: Antenna
	<b>APC</b>	: Automatic Phase Control
	<b>APL</b>	: Average Picture Level
	<b>ASSEM</b>	: Assembly
	<b>ASS'Y</b>	: Assembly
	<b>ATT</b>	: Attenuator
	<b>AUTO</b>	: Automatic
	<b>AUX</b>	: Auxiliary
	<b>AUD</b>	: Audio

<b>B</b>	<b>B</b>	: Brake
	<b>BAL</b>	: Balance
	<b>BATT</b>	: Battery
	<b>BCD</b>	: Binary Coded Decimal
	<b>BEG</b>	: Beginning
	<b>BFP</b>	: Burst Flag Pulse
	<b>BIT</b>	: Binary Digit
	<b>BLK</b>	: Black
	<b>BLU</b>	: Blue
	<b>BNC</b>	: Bayonet connector
	<b>BPF</b>	: Bandpass Filter
	<b>BRN</b>	: Brown
	<b>BRT</b>	: Brightness
	<b>B. SOL</b>	: Brake Solenoid
	<b>B/W</b>	: Black and White

<b>C</b>	<b>C</b>	: Ceramic
	<b>CAP</b>	: Capstan
	<b>CASS</b>	: Cassette
	<b>CF</b>	: Ceramic Filter, color Frame
	<b>CC</b>	: Cassette compartment
	<b>CE</b>	: Chip Enable
	<b>CH</b>	: Channel
	<b>CHROMA</b>	: Chrominance
	<b>CLK</b>	: Clock
	<b>CLR</b>	: Clear
	<b>CMD</b>	: Command
	<b>CNT</b>	: Count, Counter
	<b>CONV</b>	: Converter

<b>COL</b>	: Color
<b>COM</b>	: Common
<b>COMP</b>	: Comparator

<b>CONN</b>	: Connector
<b>CT</b>	: Ceramic Trap
<b>CTC</b>	: Crosstalk Cancel
<b>CTL</b>	: Control

<b>D</b>	<b>D</b>	: Drum
	<b>DAC</b>	: Digital to Analog Converter
	<b>DD</b>	: Direct Drive
	<b>DEC</b>	: Decoder
	<b>DEMODO</b>	: Demodulator
	<b>DET</b>	: Detector
	<b>DEV</b>	: Deviation
	<b>DFRS</b>	: Drum Free RUN STOP
	<b>DIF TRANS</b>	: Differential Transformer
	<b>DISCR</b>	: Discriminator
	<b>DL</b>	: Delay Line
	<b>DOC</b>	: Dropout Compensator
	<b>DRUM FF</b>	: Drum Flip Flop
	<b>DUB</b>	: Dubbing

<b>E</b>	<b>E</b>	: Edit, Erase
	<b>EDP</b>	: Electronic Data Processing
	<b>E-E</b>	: Electric to Electric
	<b>EF</b>	: Emitter-Follower
	<b>EMPHA</b>	: Emphasis
	<b>EMG</b>	: Emergency
	<b>ENC</b>	: Encoder
	<b>EN</b>	: Enable
	<b>EQ</b>	: Equalizer
	<b>ESNS</b>	: End Sensor
	<b>EXP</b>	: Expander
	<b>EXT</b>	: External

<b>F</b>	<b>FE</b>	: Full Erase
	<b>FF</b>	: Fast Forward
		: Flipflop
	<b>FG</b>	: Frequency Generator
	<b>FM</b>	: Frequency Modulation
	<b>FMA</b>	: FM Audio
	<b>FREQ</b>	: Frequency
	<b>F-V CONV</b>	: Frequency to Voltage Converter
	<b>FWD</b>	: Forward

<b>G</b>	<b>GDL</b>	: Grass Delay Line
	<b>GEN LOCK</b>	: Generator Lock
	<b>GND</b>	: Ground
	<b>GRN</b>	: Green
	<b>GRY</b>	: Gray

<b>H</b>	<b>H</b>	: High, Horizontal
	<b>HG</b>	: Hall Generator
	<b>HPF</b>	: Highpass Filter

<b>I</b>	<b>IF</b>	: Intermediate Frequency
	<b>IFT</b>	: Intermediate Frequency Transformer
	<b>IND</b>	: Indicator
	<b>INH</b>	: Inhibit
	<b>INS</b>	: Insert
	<b>INT</b>	: Internal, Interrupt
	<b>INV</b>	: Inverter
	<b>I/O</b>	: Input/Output

<b>L</b>	<b>L</b>	: Low
	<b>LB</b>	: Low Band
	<b>LCD</b>	: Liquid Crystal Display
	<b>LE</b>	: Loading End
	<b>LED</b>	: Light Emitting Diode
	<b>LIN</b>	: Linearity
	<b>LIM</b>	: Limiter
	<b>LOAD</b>	: Loading
	<b>LP</b>	: Long Play
	<b>LPF</b>	: Lowpass Filter
	<b>LT</b>	: Loading Tension

<b>M</b>	<b>MAX</b>	: Maximum
	<b>MDA</b>	: Motor Drive Amplifier
	<b>MIC</b>	: Microphone
	<b>MIN</b>	: Minimum
	<b>MIX</b>	: Mixer
	<b>MM</b>	: Monostable Multivibrator
	<b>MOD</b>	: Modulator
	<b>MON</b>	: Monitor
	<b>MOS</b>	: Metal Oxide Semiconductor
	<b>MPX</b>	: Multiplexer
	<b>MS</b>	: Mode Select
	<b>MUT</b>	: Muting

<b>N</b>	<b>NC</b>	: Noise Cancel
	<b>NFB</b>	: Negative Feedback
	<b>NO</b>	: Normally Open

<b>O</b>	<b>OPAMP</b>	: Operational Amplifier
	<b>OP</b>	: Operation
	<b>ORN</b>	: Orange
	<b>OSC</b>	: Oscillator

<b>P</b>	<b>PB</b>	: Playback
	<b>PC</b>	: Photocoupler
	<b>PCM</b>	: Pulse Code Modulation
	<b>PGM</b>	: Program
	<b>PG</b>	: Pulse Generator
	<b>PI</b>	: Photo Interrupter
	<b>PLL</b>	: Phase Locked Loop
	<b>POS</b>	: Position
	<b>PR</b>	: Pinch Roller
	<b>PREV</b>	: Preview
	<b>PRL</b>	: Preroll
	<b>PU</b>	: Pickup
	<b>PWB</b>	: Printed Wiring Board

<b>Q</b>	<b>Q</b>	: Quality Factor
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<b>R</b>	<b>RA</b>	: Resistor Array
		: Random Access
	<b>RAM</b>	: Random Access Memory
	<b>REC</b>	: Recording

<b>REG</b>	: Regulated
<b>REV</b>	: Reverse
<b>REW</b>	: Rewind
<b>RF</b>	: Radio Frequency
<b>RST</b>	: Reset
<b>R/P</b>	: Record/Playback
<b>RPT</b>	: Repeat
<b>RT</b>	: Rotary Transformer
<b>RY</b>	: Relay

<b>S</b>	<b>S</b>	: Search, Servo
	<b>SC</b>	: Subcarrier
	<b>SEAR</b>	: Search
	<b>SEL</b>	: Select
	<b>SENS</b>	: Sensor
	<b>SEP</b>	: Separator
	<b>SF</b>	: Source Follower
	<b>SFF</b>	: Short Fast Forward
	<b>SFWD</b>	: Search Forward
	<b>SI</b>	: Serial In
	<b>SIG</b>	: Signal
	<b>SO</b>	: Serial Out
	<b>SOL</b>	: Solenoid
	<b>SOS</b>	: Sound on Sound
	<b>SP</b>	: Standard Play
	<b>SR</b>	: Supply Reel
	<b>SREV</b>	: Search Reverse
	<b>SREW</b>	: Short Rewind
	<b>SSG</b>	: Sync Signal Generator
	<b>STL</b>	: Still
	<b>SUP</b>	: Supply
	<b>SYNC</b>	: Synchronization
	<b>SYSCON</b>	: System control

<b>T</b>	<b>TBC</b>	: Time Base Corrector
	<b>TC</b>	: Tension Control, Time Code
	<b>TDG</b>	: Time Date Generator
	<b>T. EALM</b>	: Tape End Alarm
	<b>TEN</b>	: Tension
	<b>TIM</b>	: Timing
	<b>TK</b>	: Tracking
	<b>TL</b>	: Time Lapse
	<b>TREC</b>	: Timer Record
	<b>TSW</b>	: Time Switch
	<b>TU</b>	: Take-up
	<b>TUR</b>	: Take-up Reel

<b>U</b>	<b>UNLD</b>	: Unloading
	<b>UNREG</b>	: Unregulated
	<b>UNSW</b>	: Unswitched

<b>V</b>	<b>V</b>	: Video, Vertical
	<b>VCO</b>	: Voltage Controlled Oscillator
	<b>VD</b>	: Vertical Drive
	<b>VXO</b>	: Variable Crystal Oscillator
	<b>VLT</b>	: Violet
	<b>VSCH</b>	: Variable Search

<b>W</b>	<b>WHT</b>	: White
	<b>WV</b>	: Working Voltage
	<b>WARN</b>	: Warning

<b>X</b>	<b>XTL</b>	: Crystal
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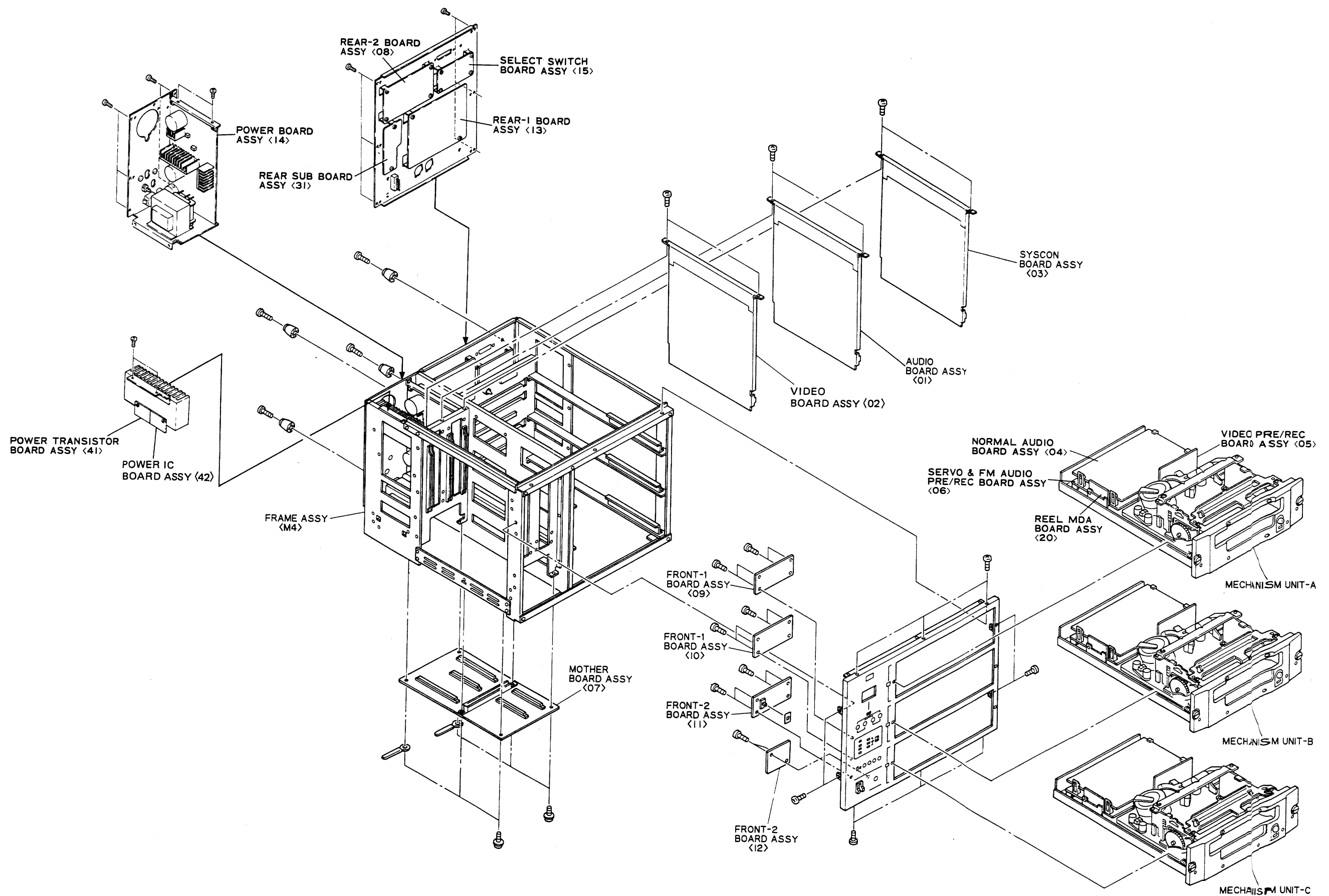
<b>Y</b>	<b>Y</b>	: Luminance
	<b>YLW</b>	: Yellow

## 4.2 CIRCUIT BOARD LOCATIONS

• Index to board by kind of diagrams

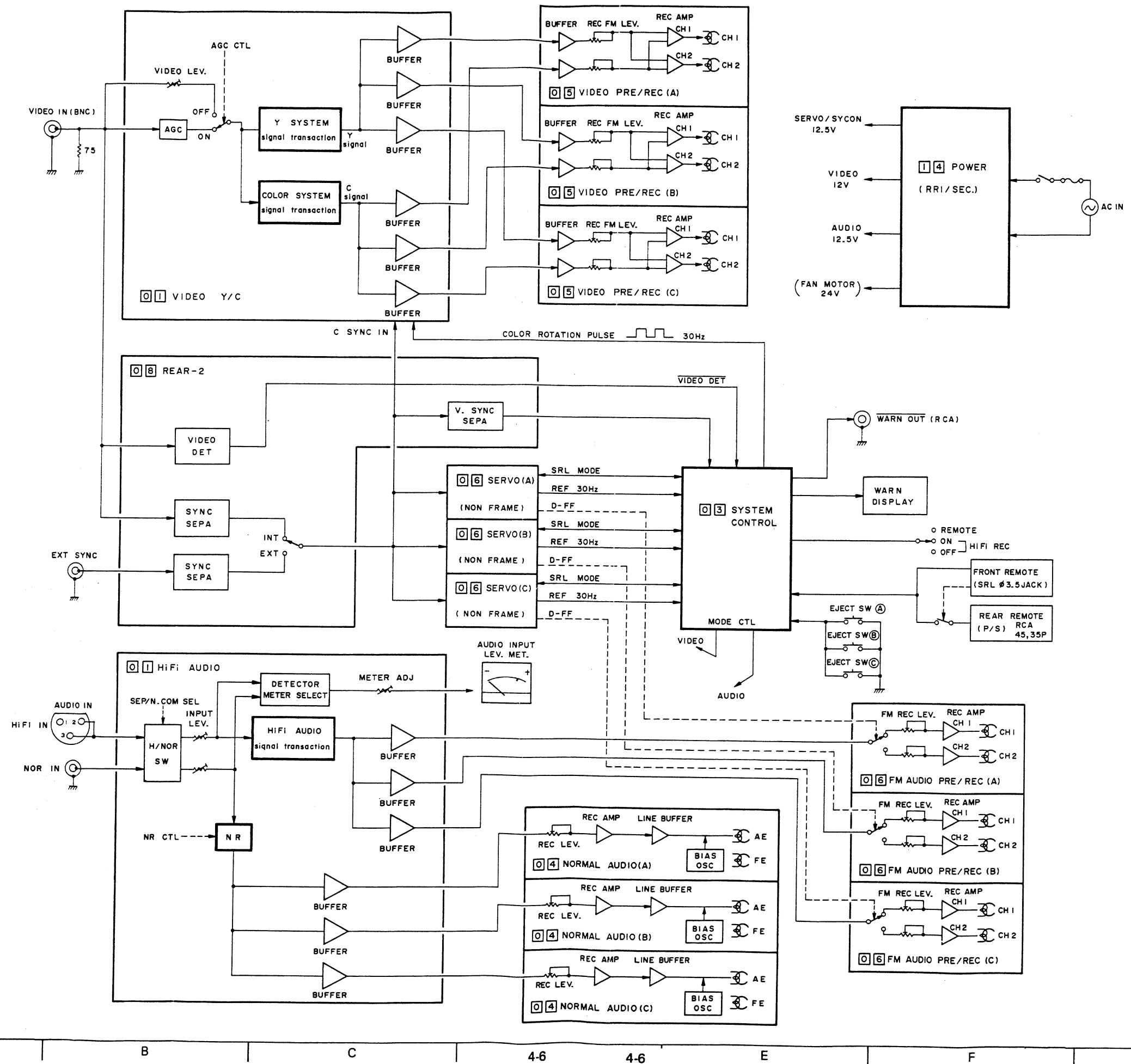
Board No.	Board Name	Page of Diagram			
		Block Diagram	Schematic Diagram	Circuit Board	Part List
01	AUDIO	4-8	4-24	4-25	6-6
02	VIDEO	4-7	4-26	4-27	6-8
03	SYS CON	4-9	4-22	4-23	6-10
04	NORMAL AUDIO	4-28	4-30	4-31	6-12
05	VIDEO PRE/REC	4-7	4-32	4-33	6-14
06	SERVO & FM AUDIO PRE/REC	4-29, 4-8	4-35, 4-34	4-36	6-15
07	MOTHER	—	4-12	4-13	6-17
08	REAR-2	4-10	4-20	4-21	6-18
09	FRONT-1(FRONT VR & SWITCH)	—	4-16	4-17	6-19
10	FRONT-1(DISPLAY)	—	4-16	4-17	6-19
11	FRONT-2(TERMINAL)	—	4-16	4-17	6-19
12	FRONT-2(REMOTE JACK)	—	4-16	4-17	6-19
13	REAR-1	—	4-18	4-19	6-19
14	POWER	—	4-14	4-15	6-20
15	SELECT SWITCH	—	4-16	4-17	6-20
16	HOUR METER & LED	—	4-37	4-37	6-20
18	SWITCH & LED	—	4-37	4-37	6-20
20	REEL MDA	—	4-35	4-36	6-21
21	DECK TERMINAL	—	4-38	4-38	6-21
22	RELAY	—	4-38	4-38	6-21
23	REC SAFETY	—	4-38	4-38	6-21
24	END SENSOR	—	4-38	4-38	6-21
31	REAR SUB	—	4-18	4-19	6-21
35	A/C HEAD	—	4-11	4-38	6-21
41	POWER TRANSISTOR	—	4-14	4-15	6-21
42	POWER IC	—	4-14	4-15	6-22
56	CASSETTE HOUSING	—	4-38	4-38	6-22
19	ID CODE	—	4-39	4-40	6-22
□□	ID CODE DISPLAY	—	4-41	4-41	—

\* Note: Since the electrical circuit of the mechanism units A, B and C is common to the three units, refer to Sect. 4.25 to Sect. 4.37.





# 4.3 SYSTEM BLOCK DIAGRAM



## 6



4

**B**

4-7

4-7

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—

\_\_\_\_\_

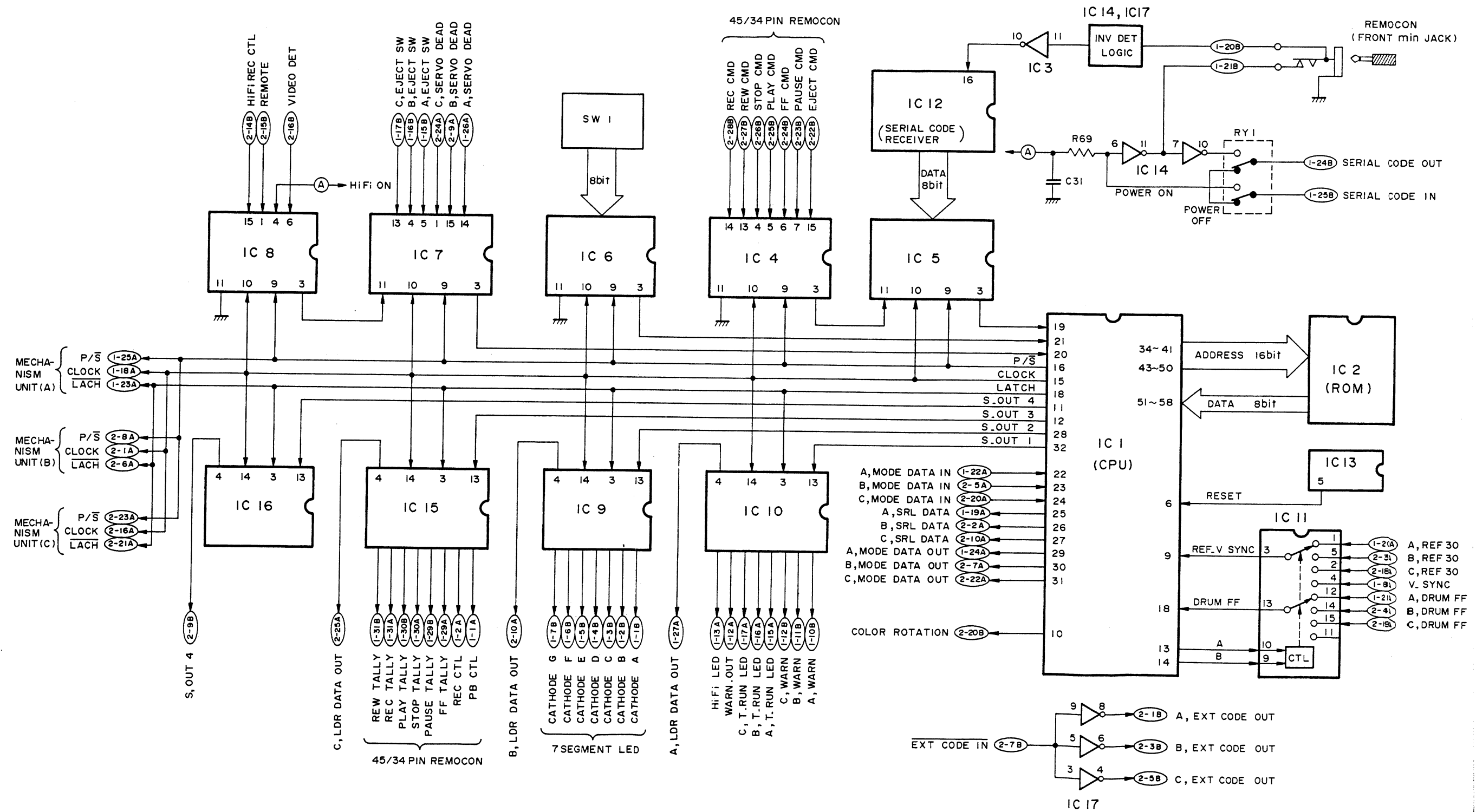
—

1

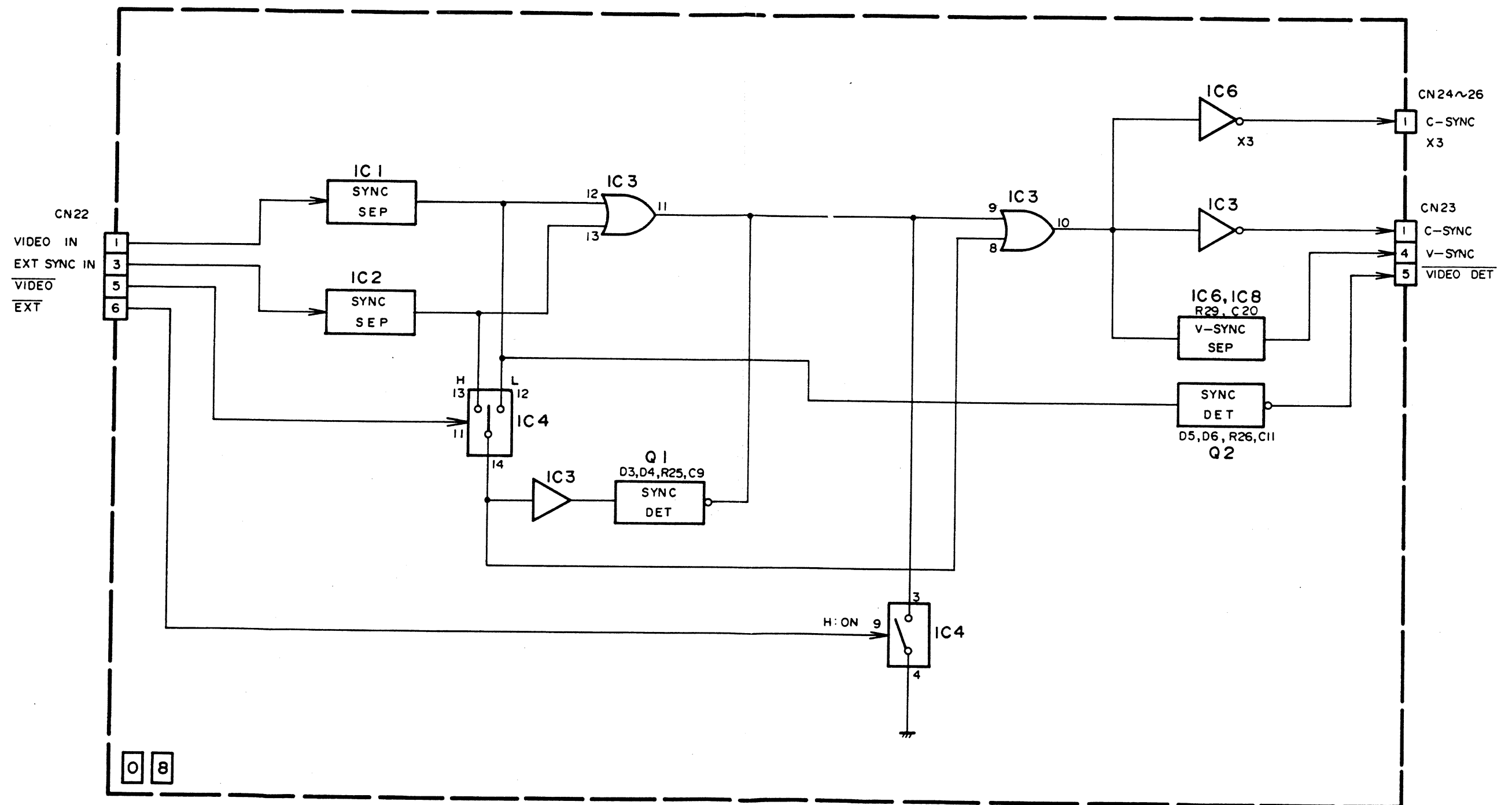
## 6



# 4.6 SYSCON BLOCK DIAGRAM

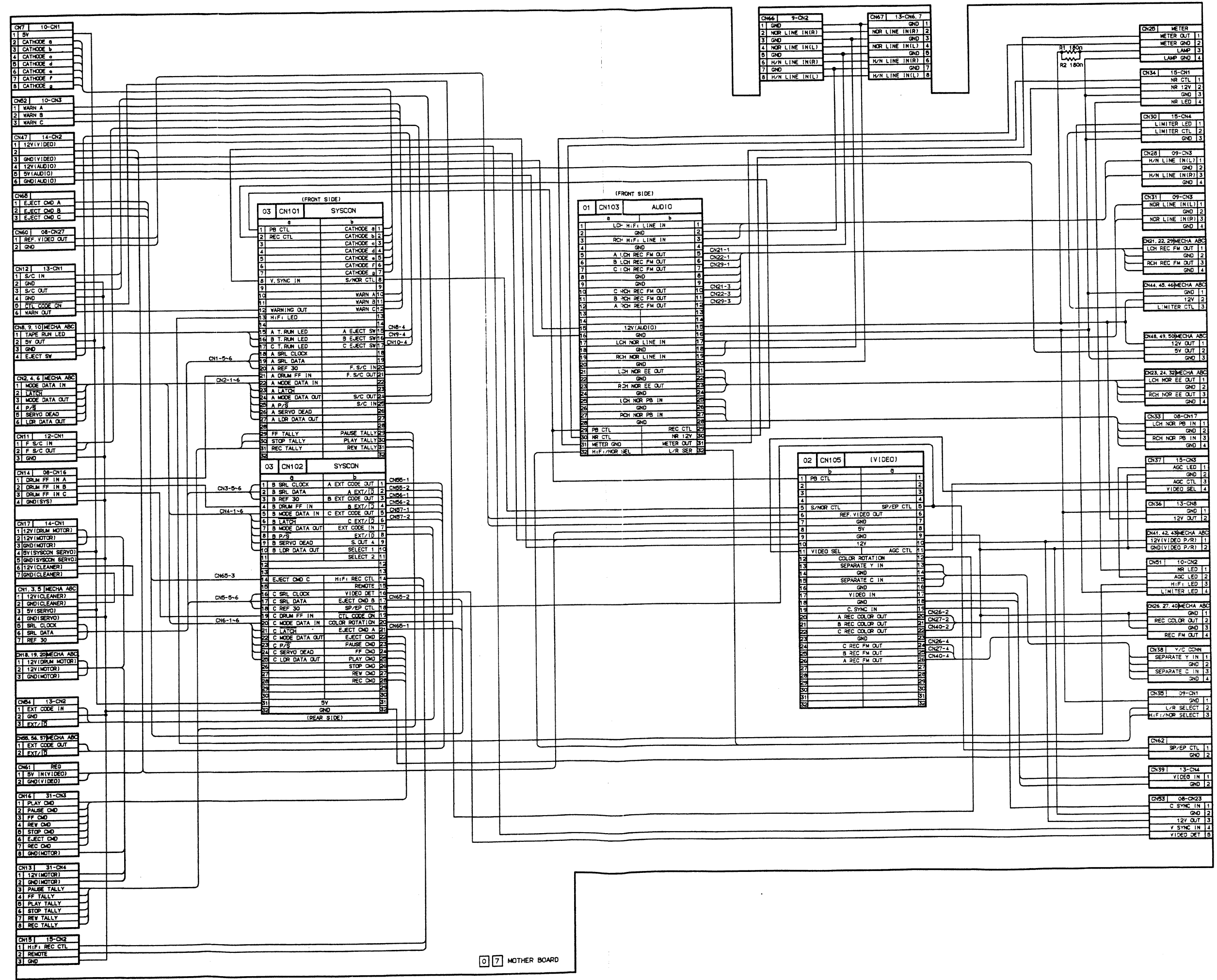


# 4.7 REAR-2 BLOCK DIAGRAM



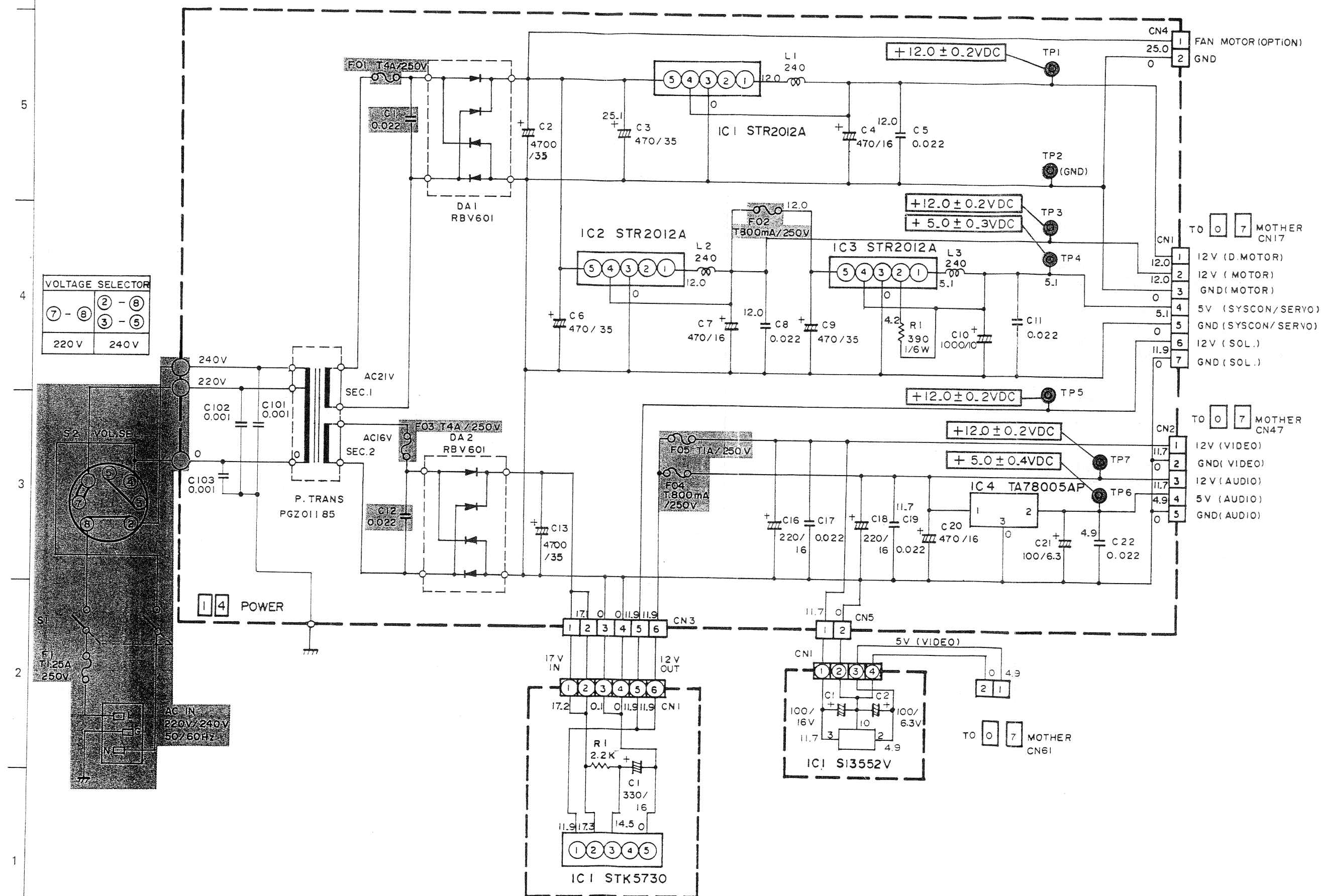


# 4.9 MOTHER SCHEMATIC DIAGRAM



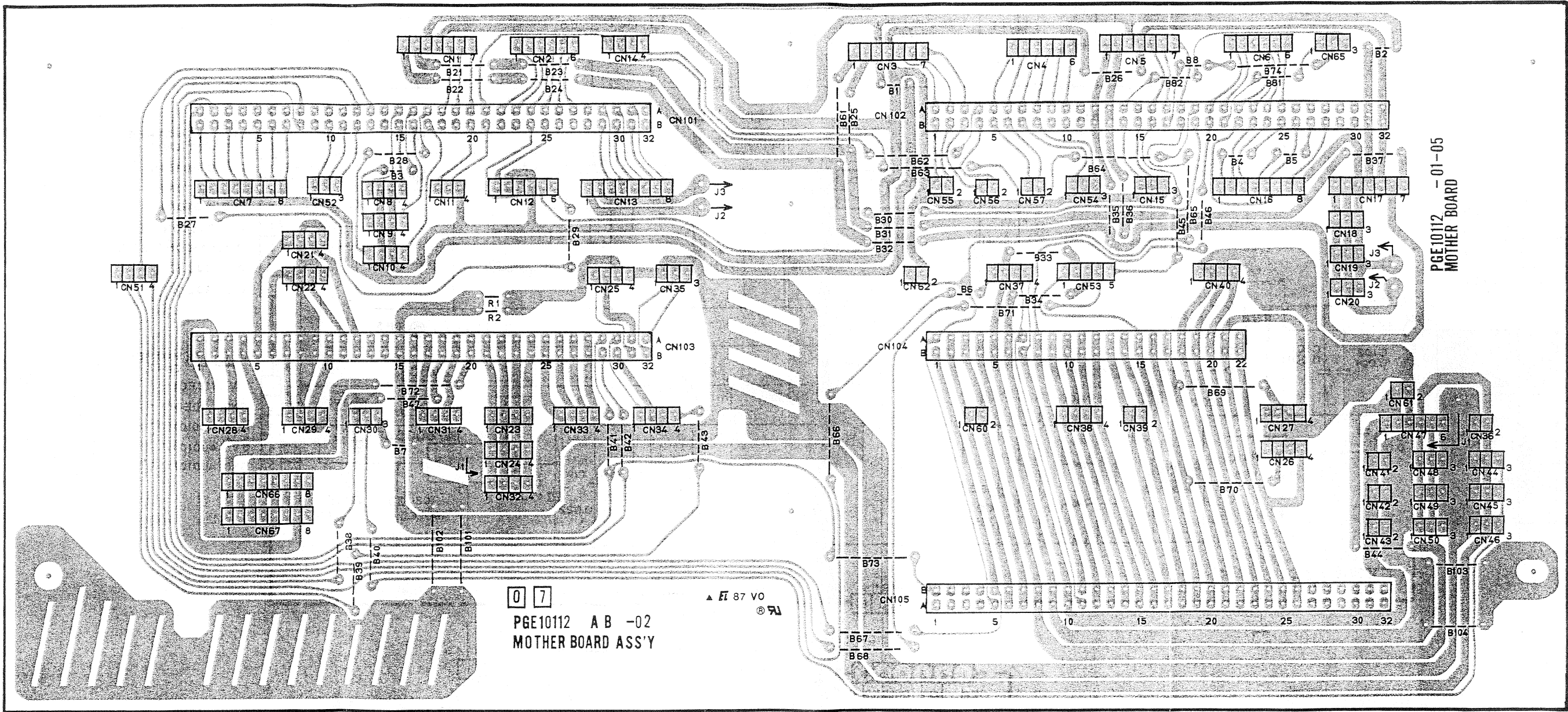


# 4.11 POWER & POWER TRANSISTOR, IC SCHEMATIC DIAGRAMS





4.10 MOTHER CIRCUIT BOARD



A

B

C

4.13

4.13

E

F

G

H

## 6

5



3

2

1

A

B

C

4-15

4-15

E

---

11

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G

PGE 40269-01-01

POWER IC PWB

GND OUT IN

C2

CN1

C1

4 2

PGE 40269 A

POWER IC PWB ASS'Y

4

### • VOLTAGE MEASURING POINTS

IC	
Symbol No.	Measuring point
IC1-3	GND
IC1-4	B2
IC1-5	B5
IC2-3	GND
IC2-4	C8
IC2-5	B5
IC3-2	R1
IC3-3	GND
IC3-4	TP4
IC3-5	FQ2
IC4-1	C19
IC4-2	TP6
IC4-3	GND

## 1

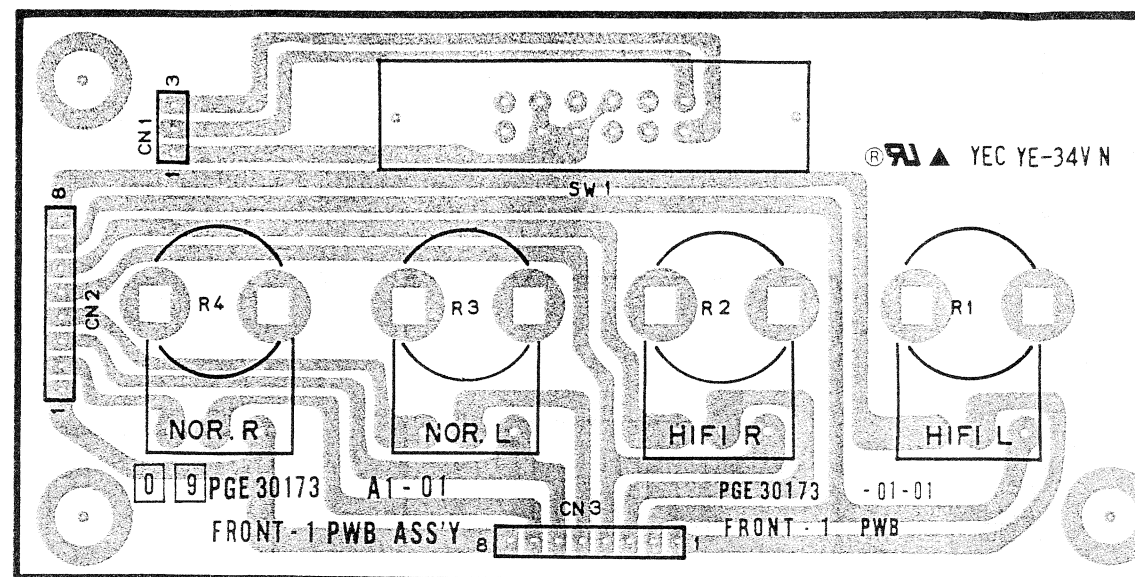
C

H

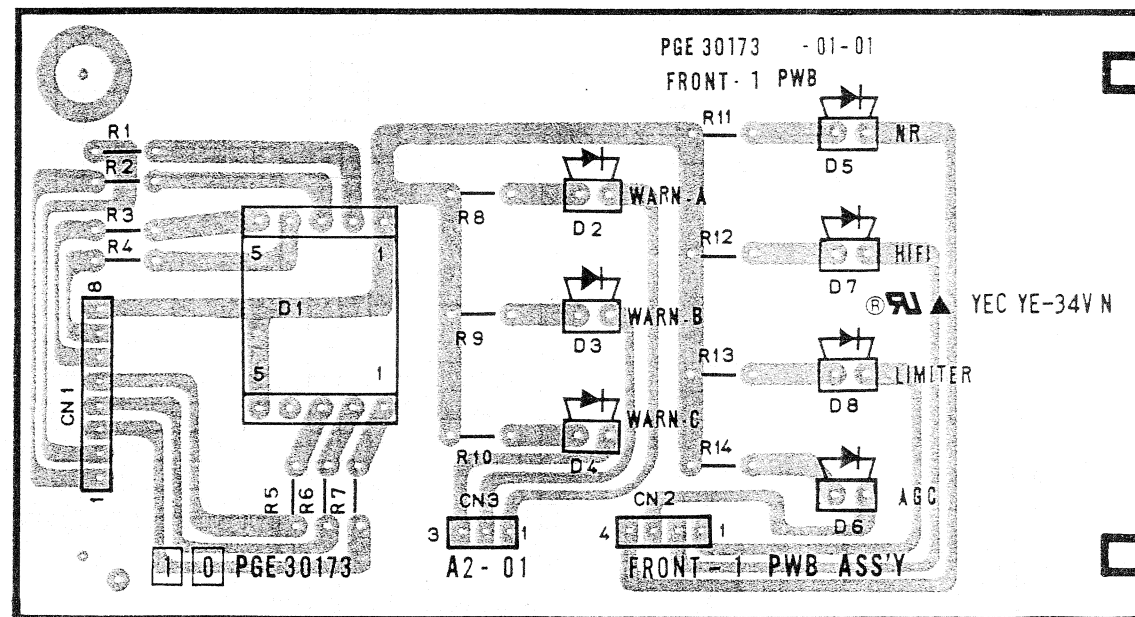


# 4.14 FRONT-1, -2 & SELECT SWITCH CIRCUIT BOARDS

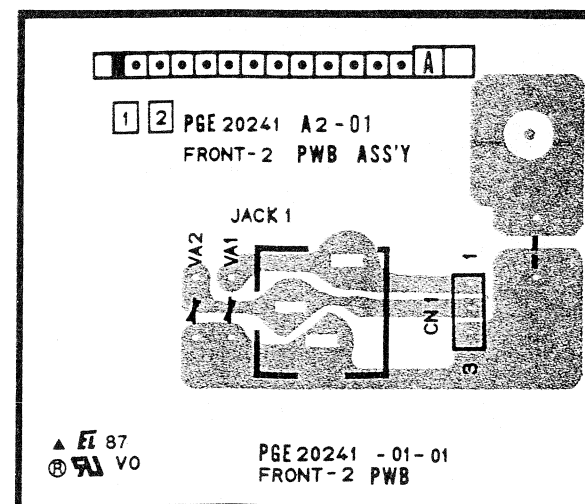
## — FRONT-1 (FRONT VR & SW) —



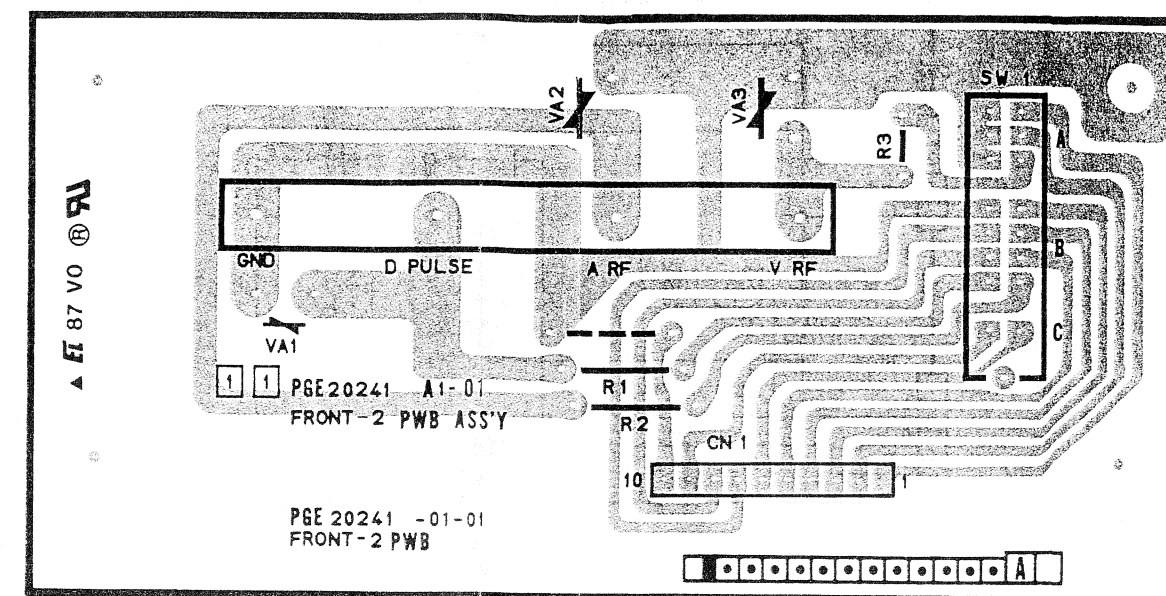
## — FRONT-1 (DISPLAY) —



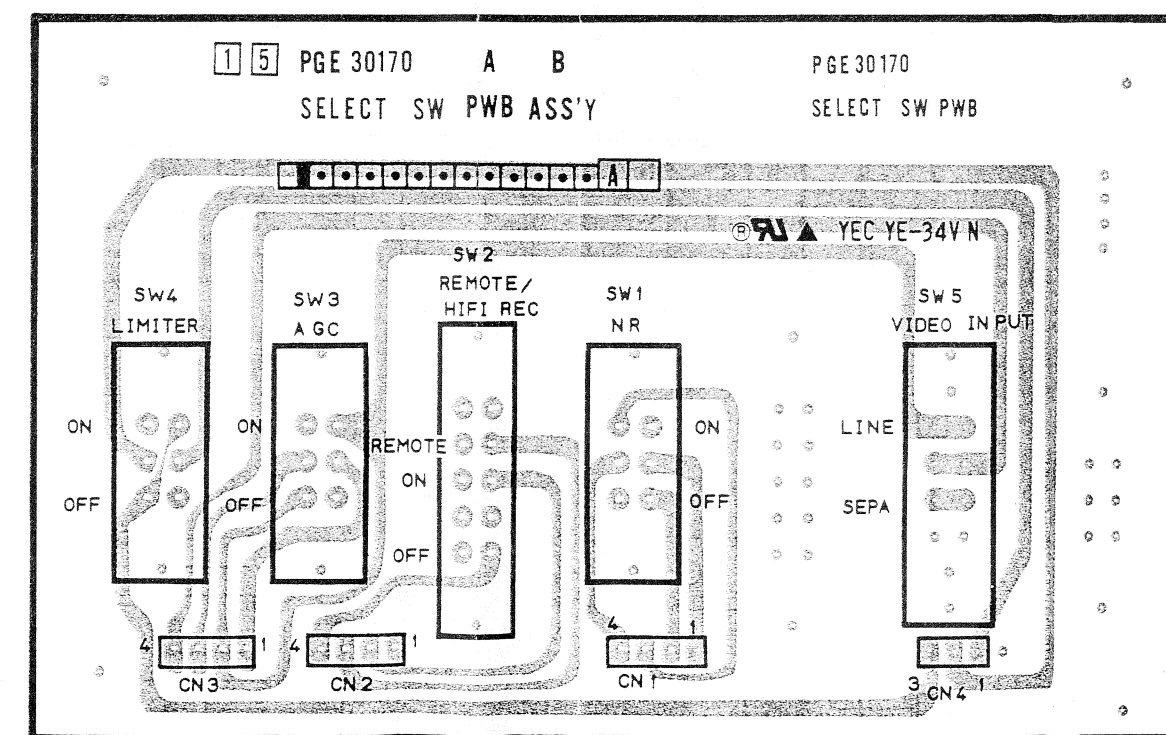
## — FRONT-2 (REMOTE JFACK) —



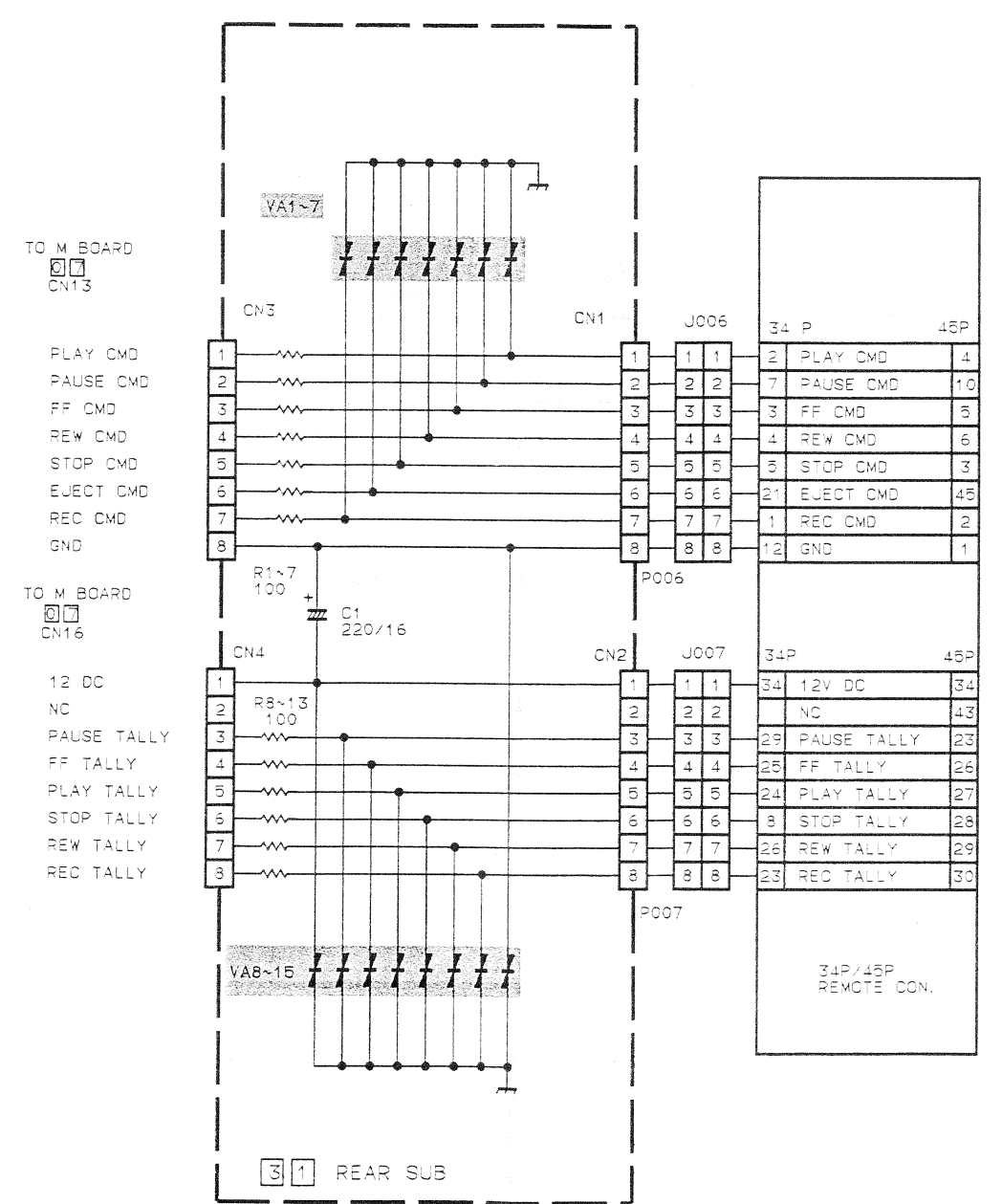
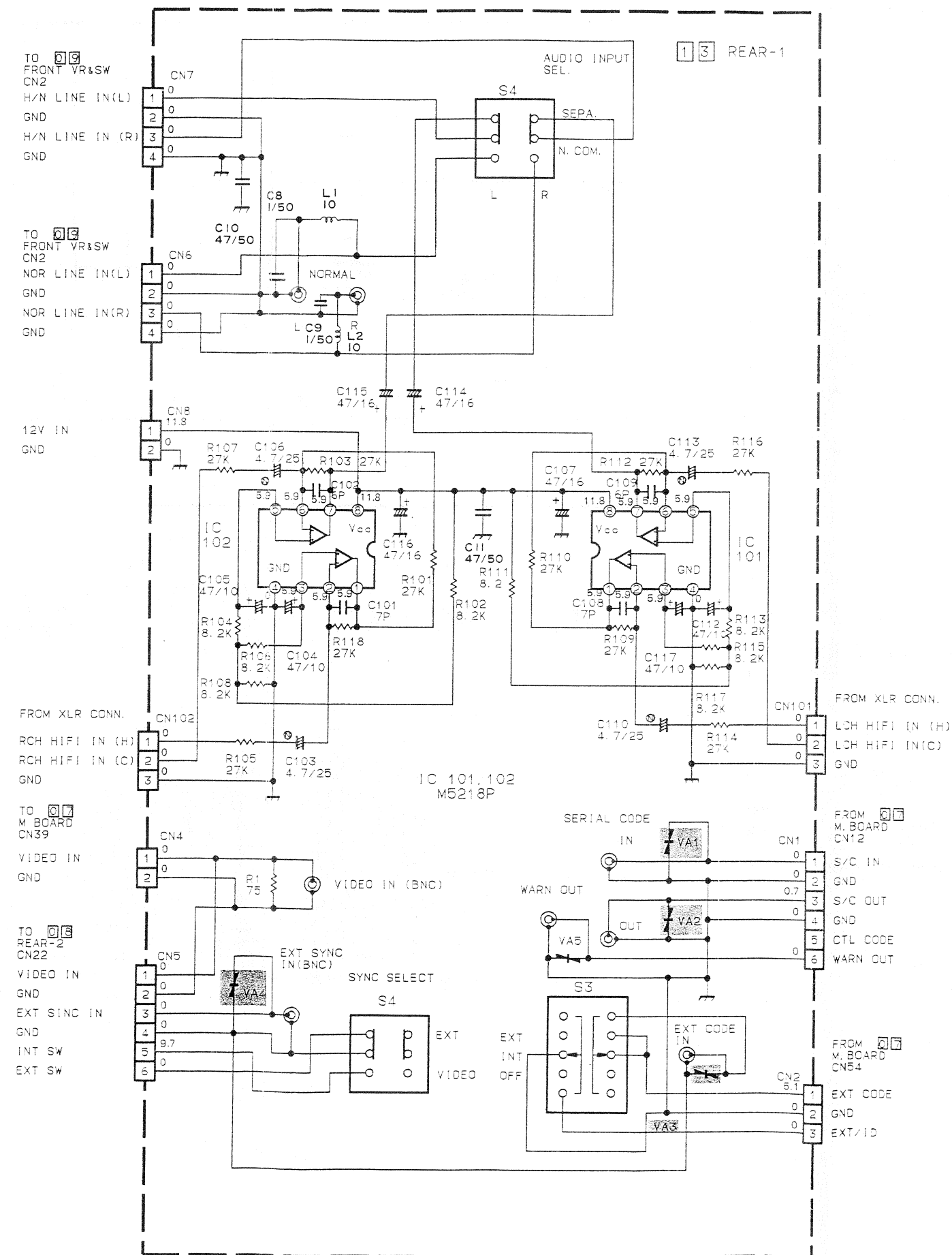
## — FRONT-2 (TERMINAL) —



## — SELECT SW —



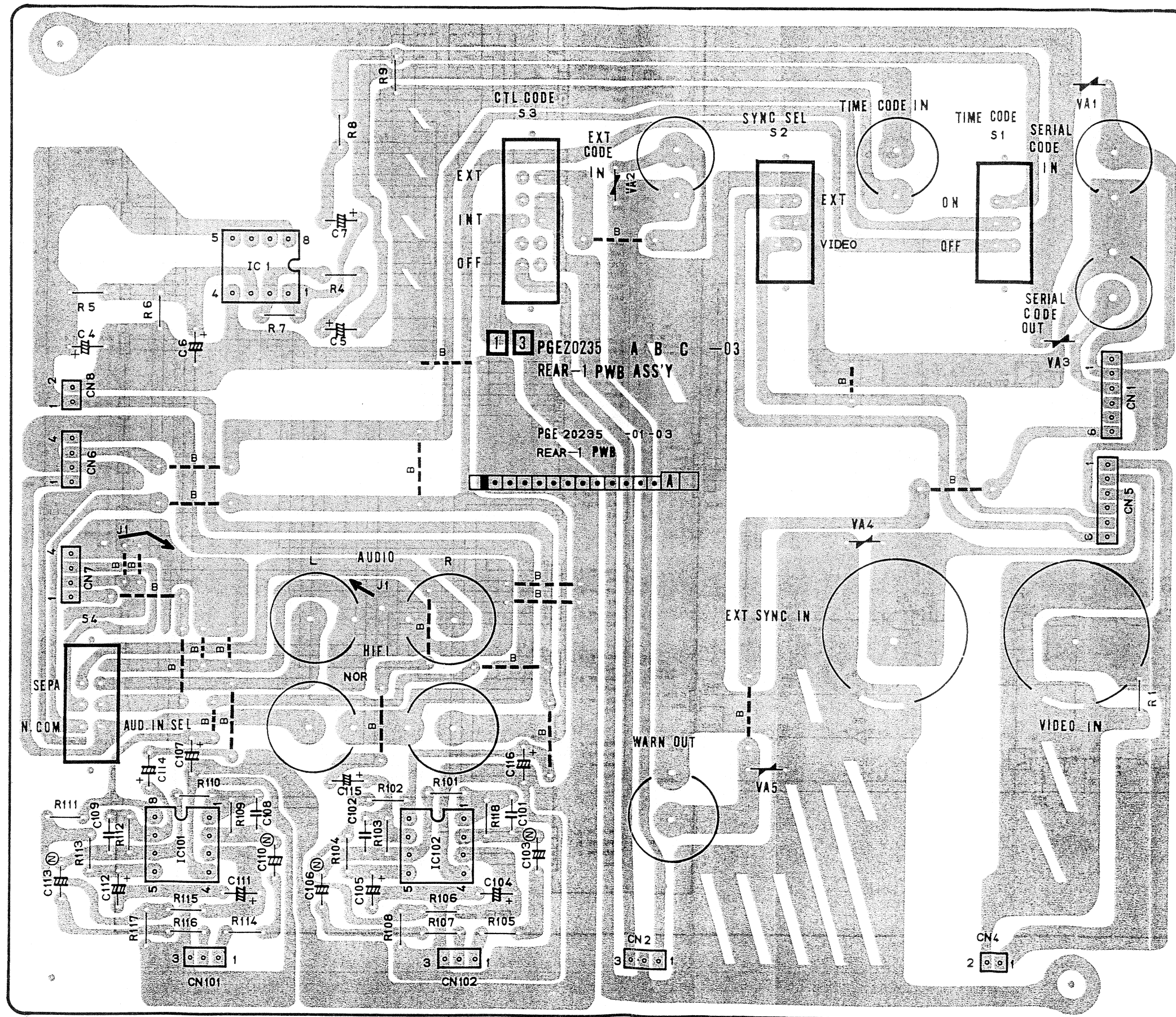
# 4.15 REAR-1, REAR SUB SCHEMATIC DIAGRAMS



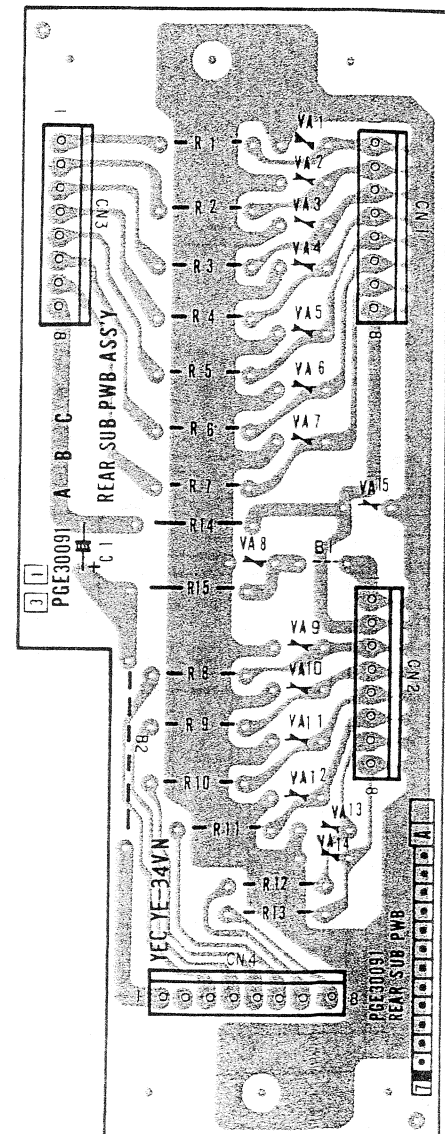


# 4.16 REAR-1, REAR SUB CIRCUIT BOARDS

— REAR-1 —  
(Front)



— REAR SUB —



A

B

C

4-19

4-19

E

F

G

H

# 4.17 REAR-2 SCHEMATIC DIAGRAM

6

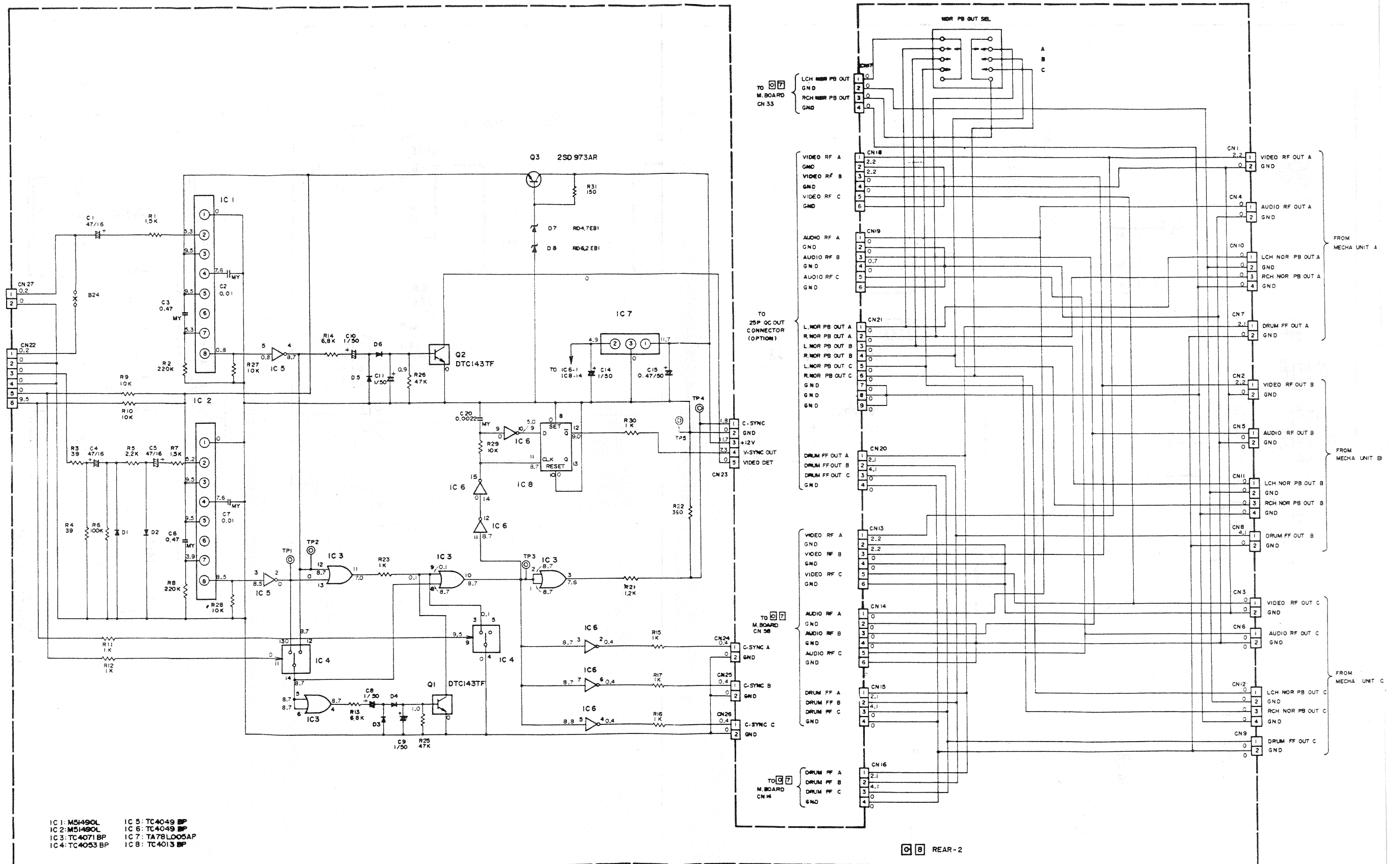
5

4

3

2

1



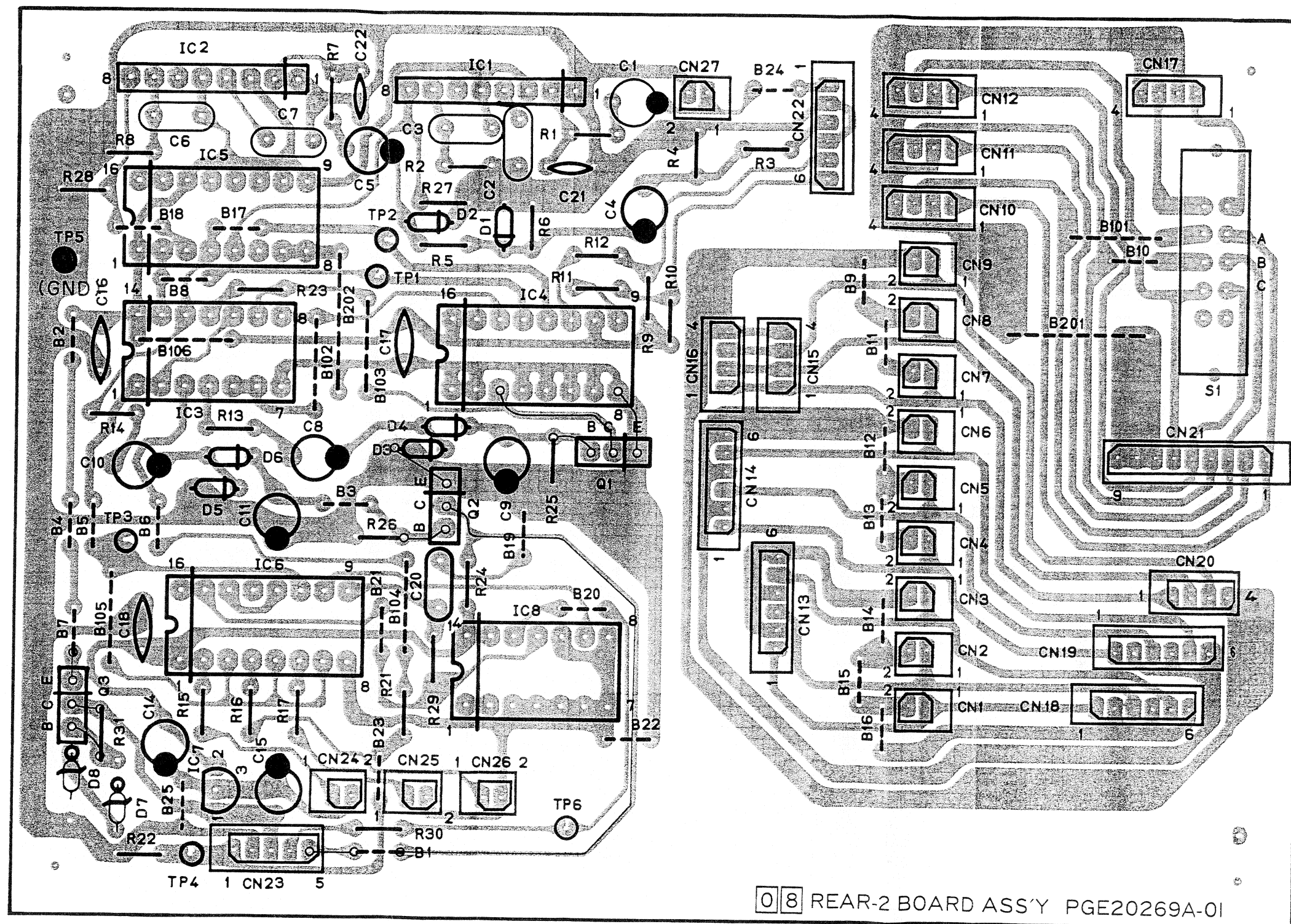


# 4.18 REAR-2 CIRCUIT BOARD

(Front)

• VOLTAGE MEASURING POINTS

TRANSISTOR	
Symbol No.	Measuring point
Q1-E	GND
Q1-C	IC3-9
Q1-B	R25
Q2-E	GND
Q2-C	B1(CN23-5)
Q2-B	R26
Q3-E	B7(IC1-3)
Q3-C	R31
Q3-B	D7





## 6



4

3

2

1

A

B

c

4-22

4-22

E

三

G

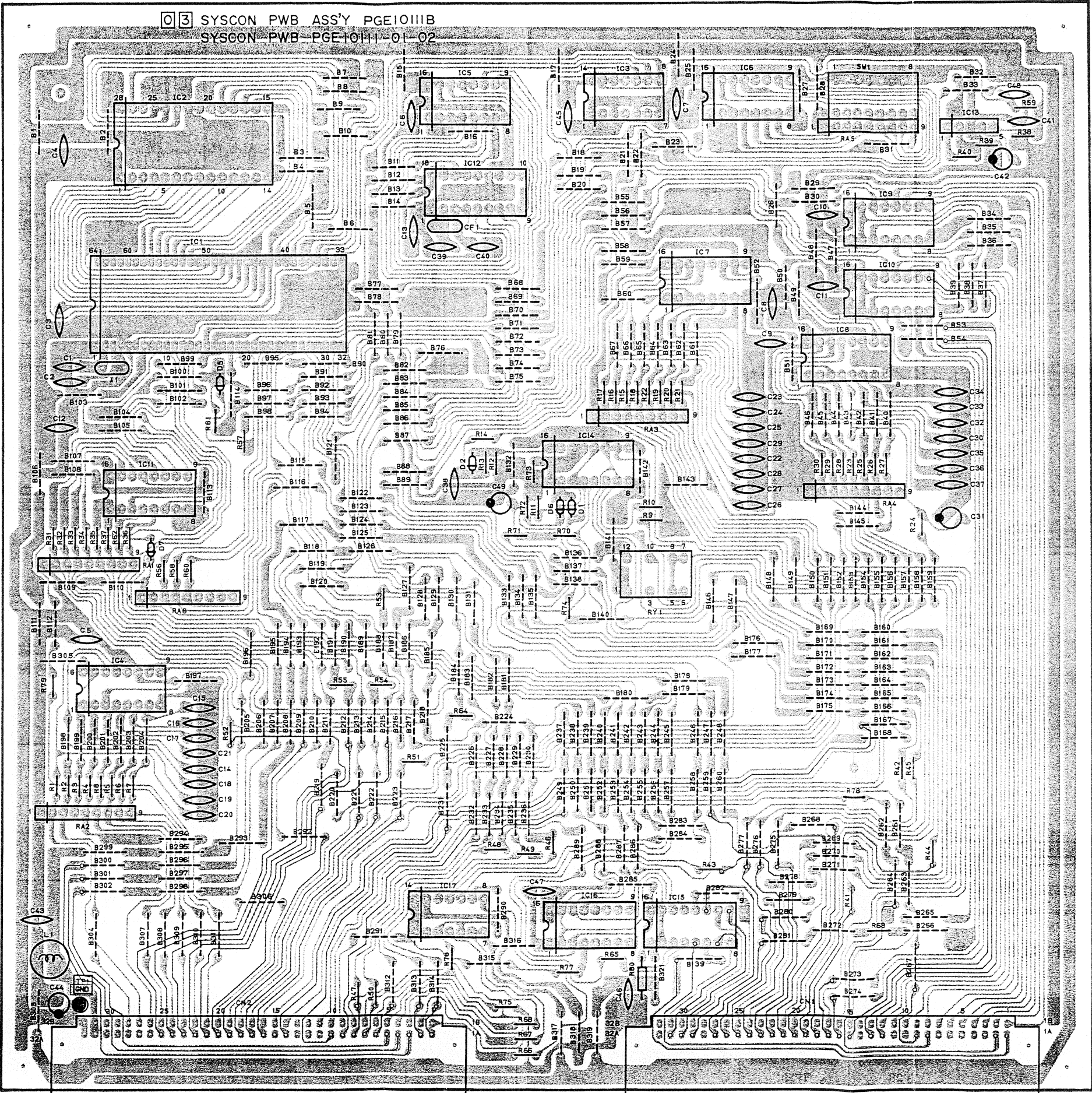
A

4.20 SYSCON CIRCUIT BOARD

(Front)

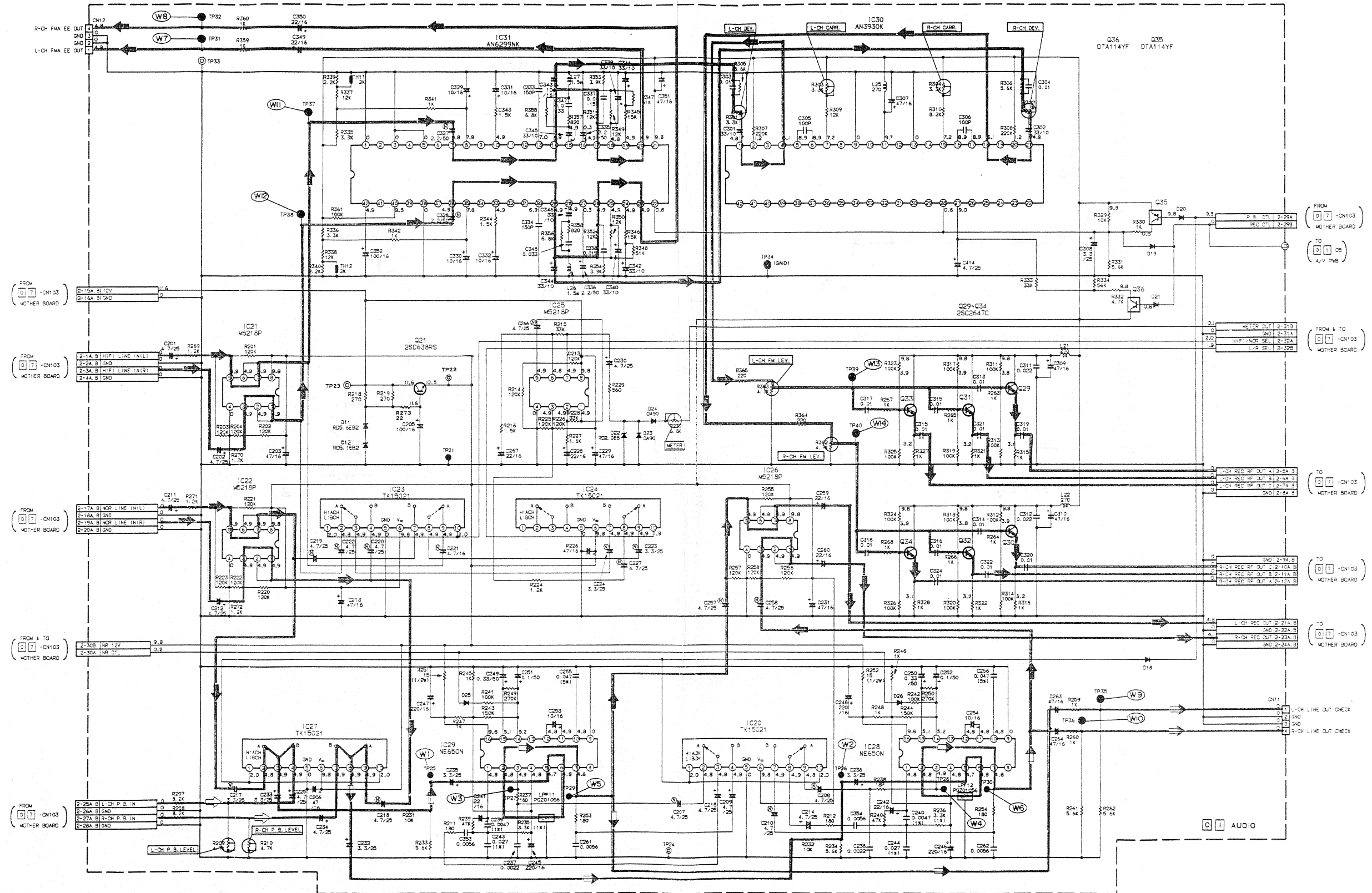
• VOLTAGE MEASURING POINTS

CONNECTOR	
Symbol No.	Measuring point
CN1-1A	B139(IC15-6)
CN1-2A	IC15-5
CN1-8A	B264(R78)
CN1-9A	B267(R31)
CN1-12A	B53(IC10-3)
CN1-13A	B54(IC10-6)
CN1-15A	IC10-9
CN1-16A	B274
CN1-17A	B273
CN1-18A	R41
CN1-19A	R44
CN1-20A	B268(R35)
CN1-21A	B259(R32)
CN1-22A	B275(R56)
CN1-23A	R43
CN1-24A	B276(R45)
CN1-25A	B277(R42)
CN1-26A	B280(R16)
CN1-27A	B281(R63)
CN1-29A	IC15-11
CN1-30A	IC15-9
CN1-31A	IC15-7
CN2-1A	B314(R46)
CN2-2A	B313(R49)
CN2-3A	B300(R36)
CN2-4A	B301(R33)
CN2-5A	B302(R58)
CN2-6A	B312(R48)
CN2-7A	R50
CN2-8A	R47
CN2-9A	B249(R17)
CN2-10A	B231(R64)
CN2-14A	B167(R25)
CN2-16A	B223(R51)
CN2-17A	B222(R54)
CN2-18A	B221(R37)
CN2-19A	B292(R34)
CN2-20A	B219(R60)
CN2-21A	B215(R53)
CN2-22A	B212(R55)
CN2-23A	R52
CN2-24A	B220(R18)
CN2-25A	B209(R65)
CN2-31A	CN2-31B
CN2-32A	TP1

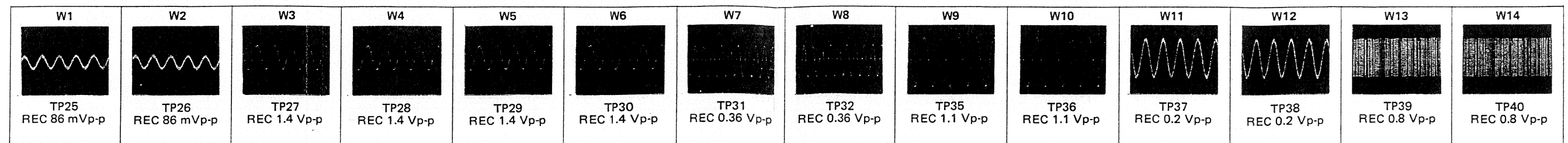




# 4.21 AUDIO (HiFi AUDIO) SCHEMATIC DIAGRAM



## - MAIN WAVEFORMS OF HiFi AUDIO CIRCUIT -



A

B

C

4-24

4-24

E

F

G

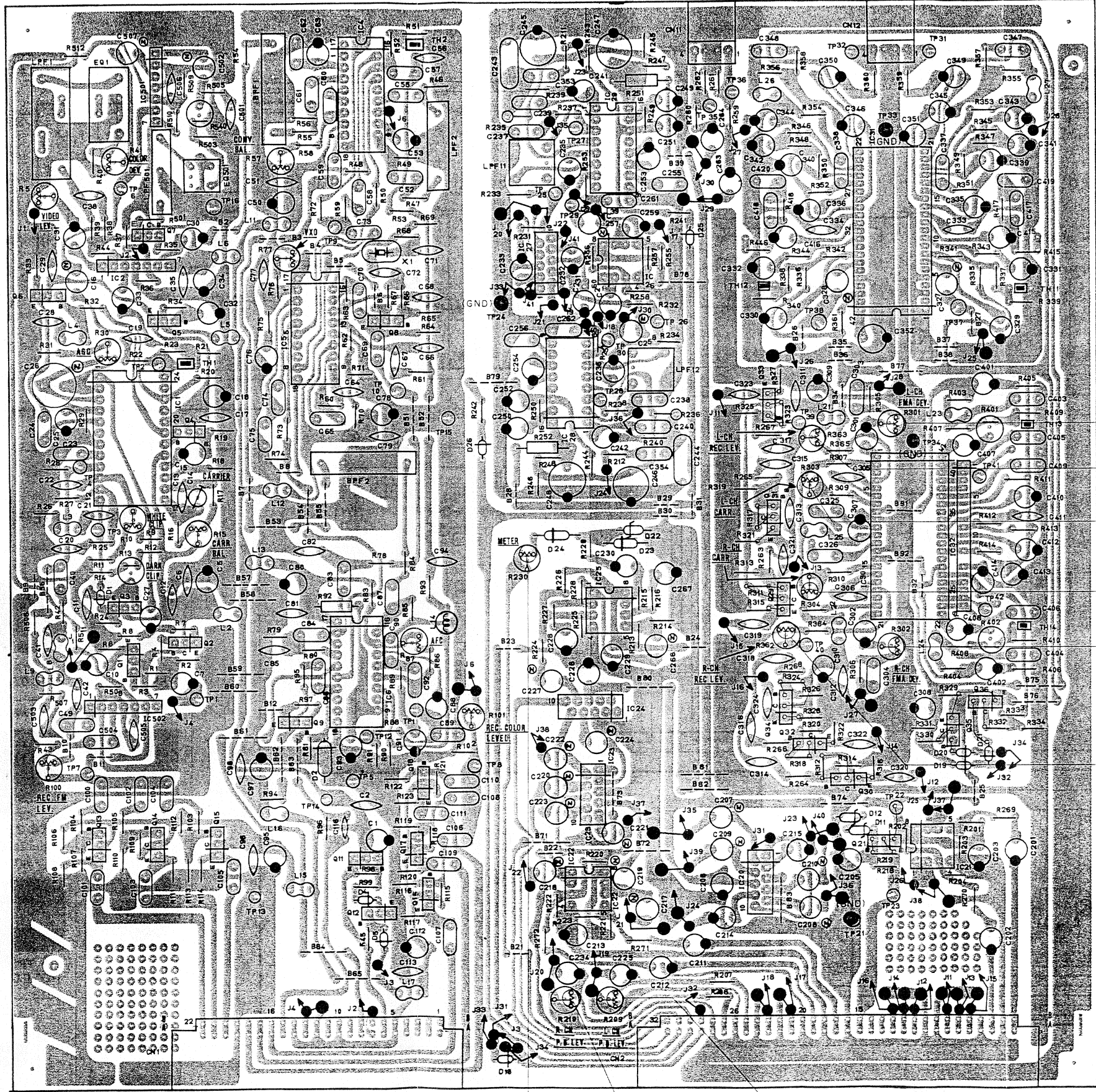
H

4.22 AUDIO (HiFi AUDIO) CIRCUIT BOARD

(Front)

• VOLTAGE MEASURING POINTS  
— HiFi AUDIO SECTION —

TRANSISTOR	
Symbol No.	Measuring point
Q1-E	R6
Q1-C	R1
Q1-B	R3
Q2-E	R7
Q2-C	R1
Q2-B	R4
Q3-E	R24
Q3-C	C12
Q3-B	C11
Q4-E	R19
Q4-C	IC1-20
Q4-B	IC1-18
Q5-E	C29
Q5-C	R34
Q5-B	R34
Q6-E	R33
Q6-C	C29
Q6-B	R32
Q7-E	R39
Q7-C	R37
Q7-B	R35
Q8-E	R64
Q8-C	R67
Q8-B	R66
Q9-E	R97
Q9-C	R95
Q9-B	R97
Q11-E	R98
Q11-C	TP14
Q11-B	R98
Q12-E	GND
Q12-C	D4
Q12-B	R45
Q13-E	R108
Q13-C	R106
Q13-B	R106
Q14-E	R111
Q14-C	R109
Q14-B	R109
Q15-E	R114
Q15-C	R112
Q15-B	R112
Q16-E	R117
Q16-C	R115
Q16-B	R115
Q17-E	R120
Q17-C	R118
Q17-B	R118
Q18-E	R123
Q18-C	R121
Q18-B	R121



R301  
L-CH FMA  
DEVIATION

R363  
L-CH FM LEVEL

R303  
L-CH CARRIER

R304  
R-CH CARRIER

R302  
R-CH FMA  
DEVIATION

R362  
R-CH FM LEVEL

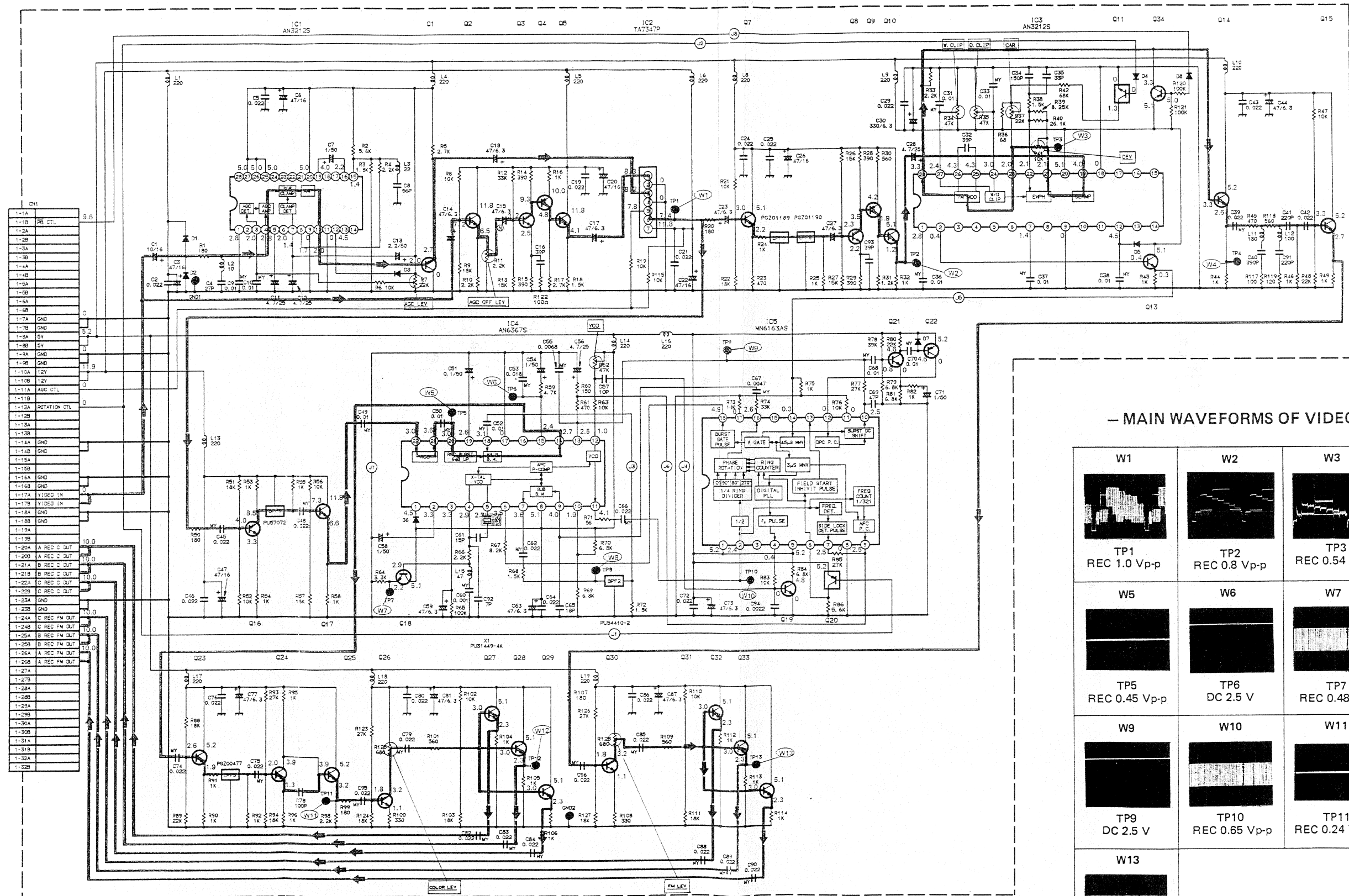
R230  
METER

R210  
R-CH PB LEVEL

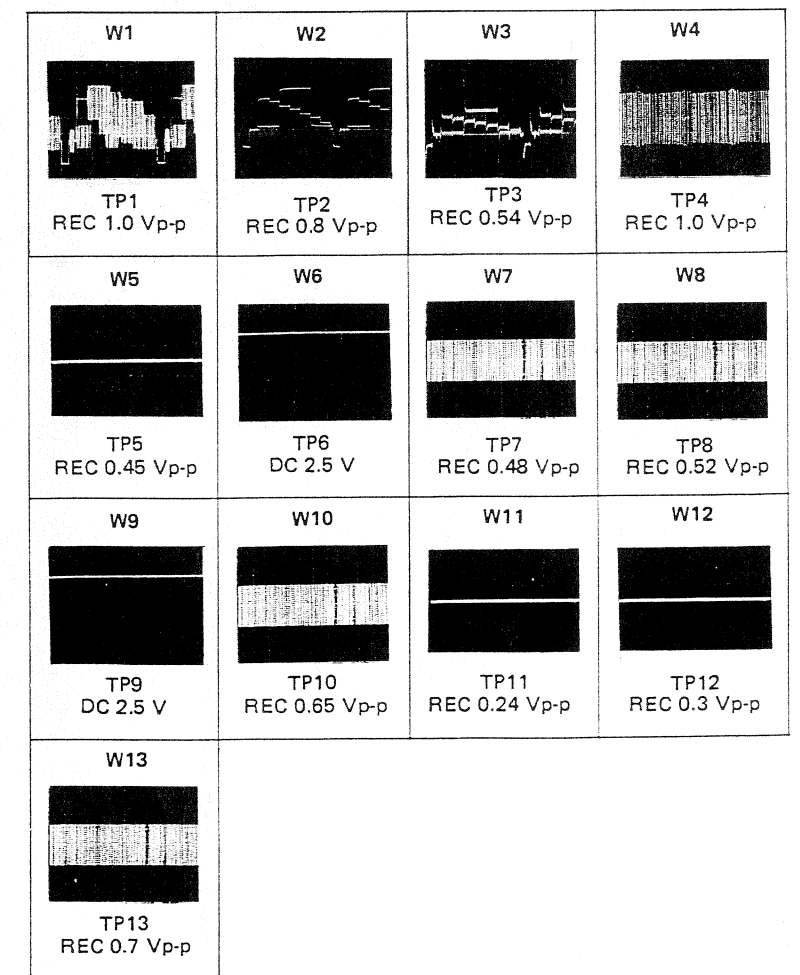
R209  
L-CH PB LEVEL



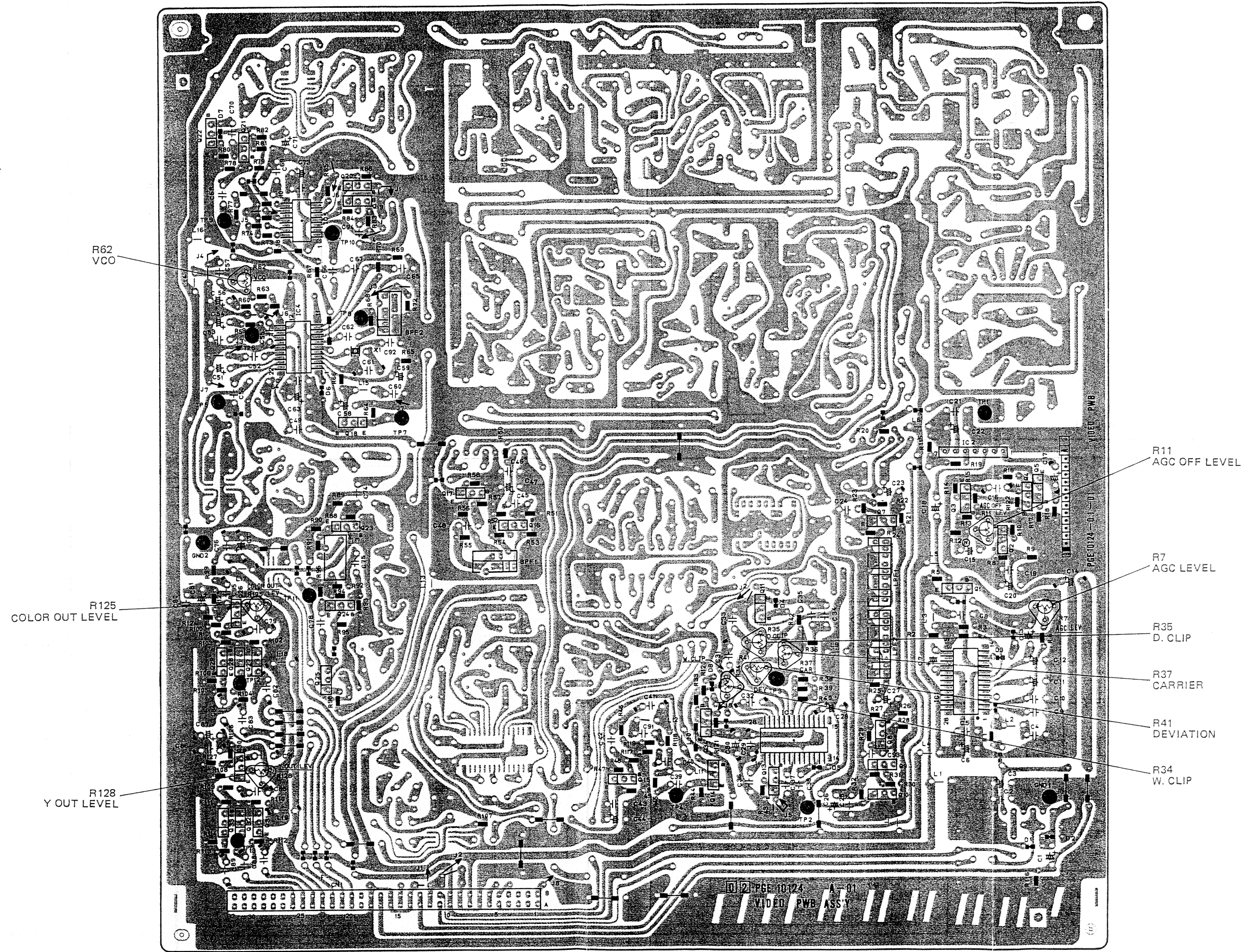
# 4.23 VIDEO SCHEMATIC DIAGRAM



— MAIN WAVEFORMS OF VIDEO CIRCUIT —

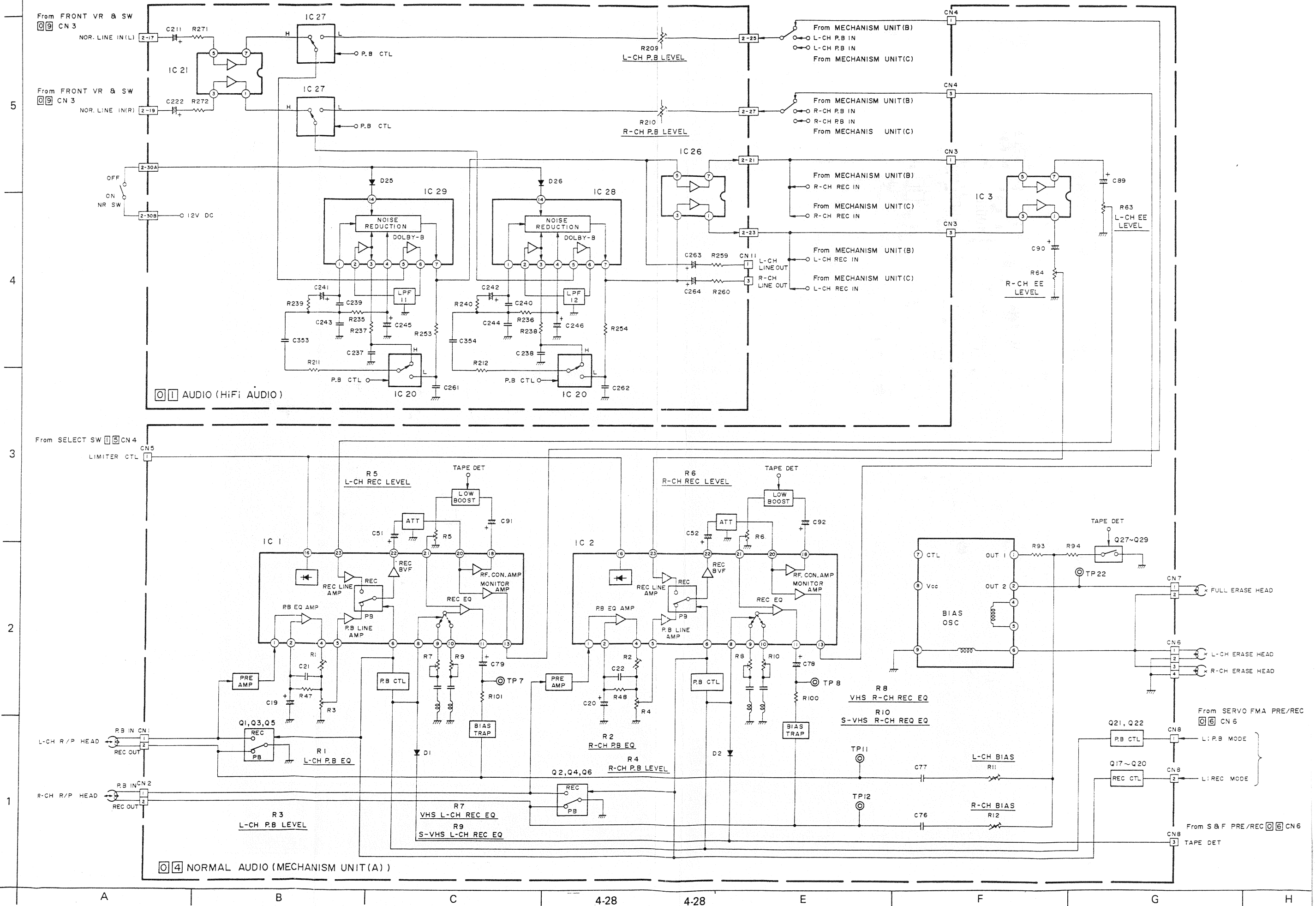


4.24 VIDEO CIRCUIT BOARD

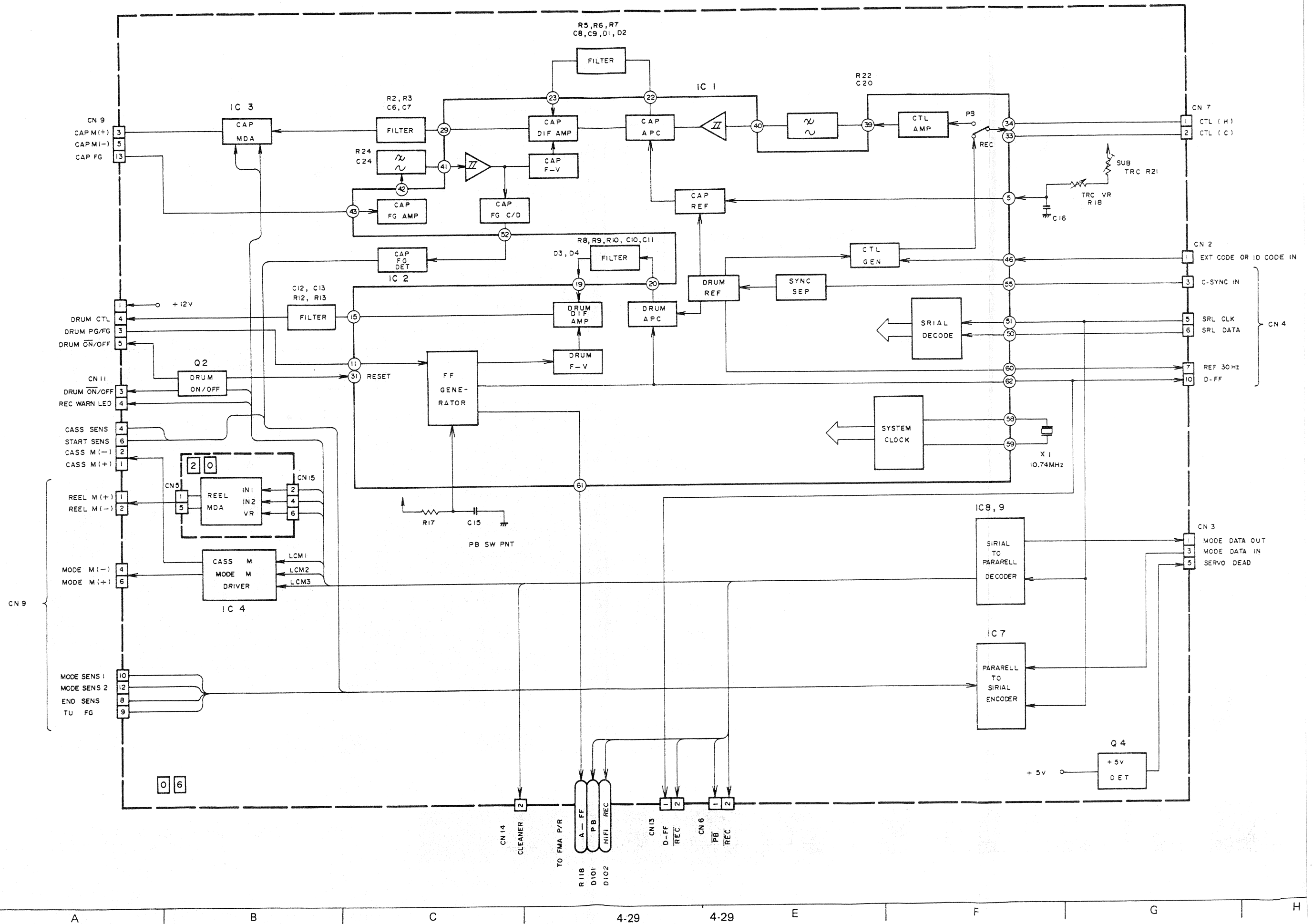




# 4.25 NORMAL AUDIO BLOCK DIAGRAM

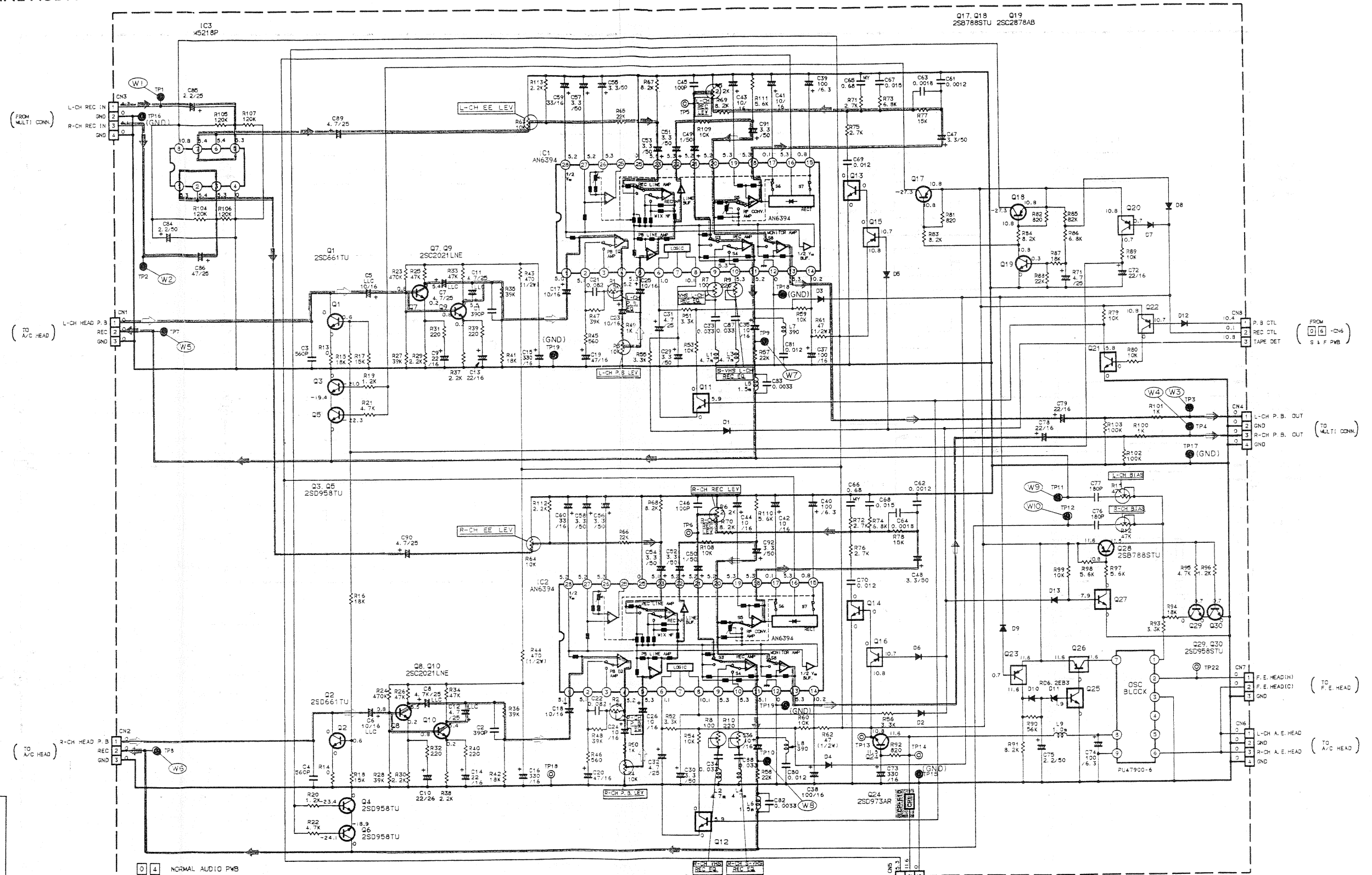


# 4.26 SERVO BLOCK DIAGRAM

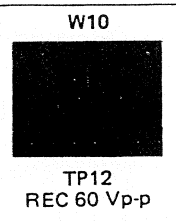
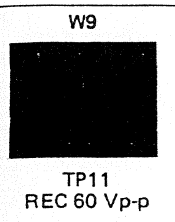
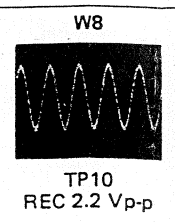
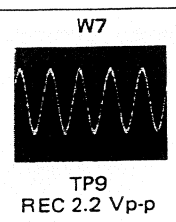
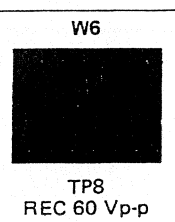
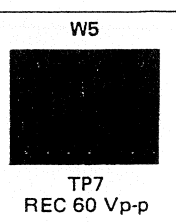
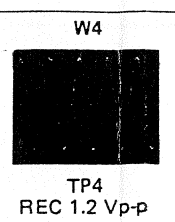
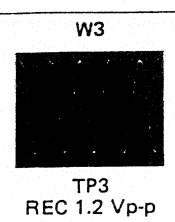
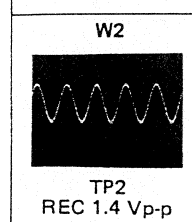
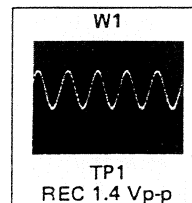




# 4.27 NORMAL AUDIO SCHEMATIC DIAGRAM

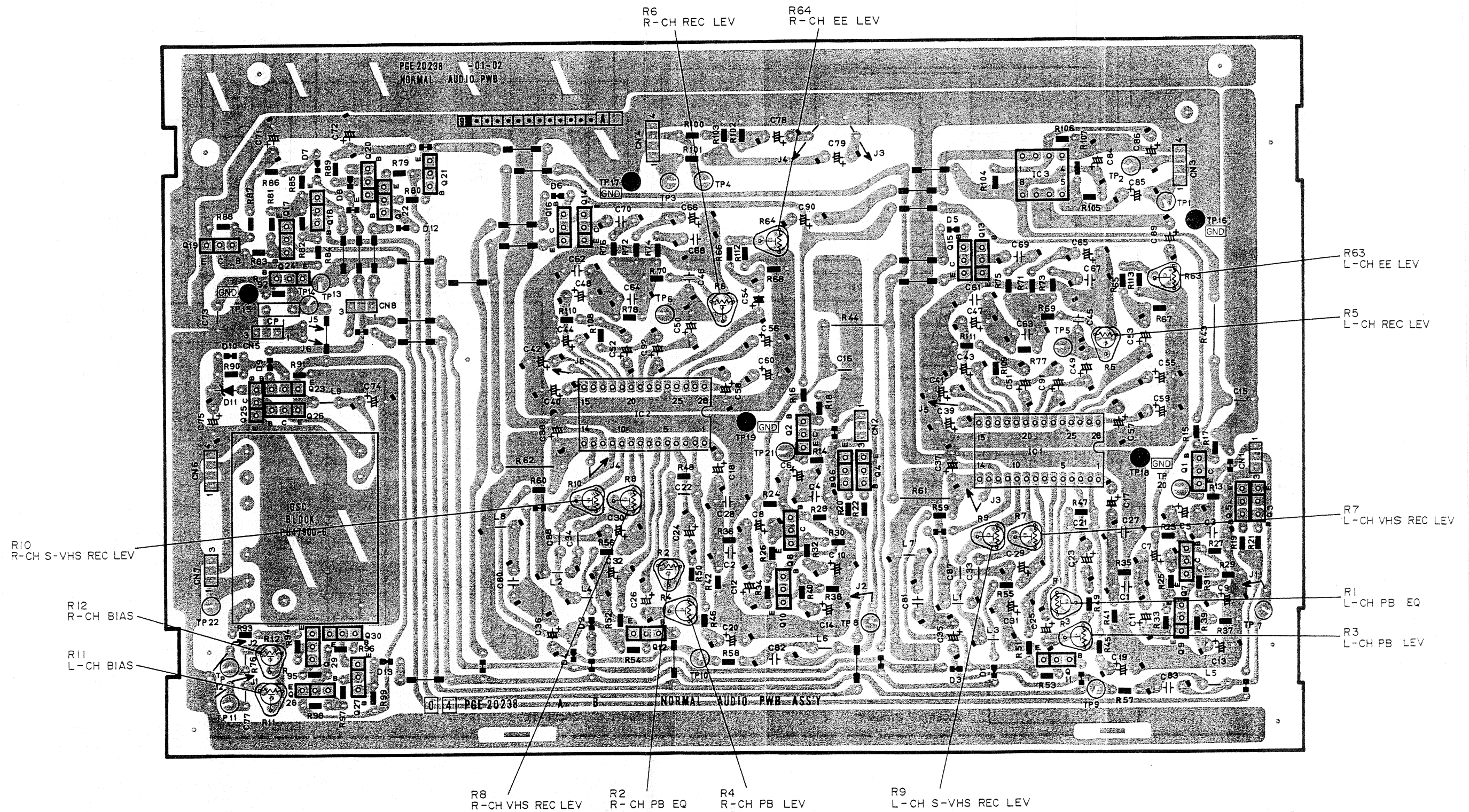


— MAIN WAVEFORMS OF NORMAL AUDIO CIRCUIT —

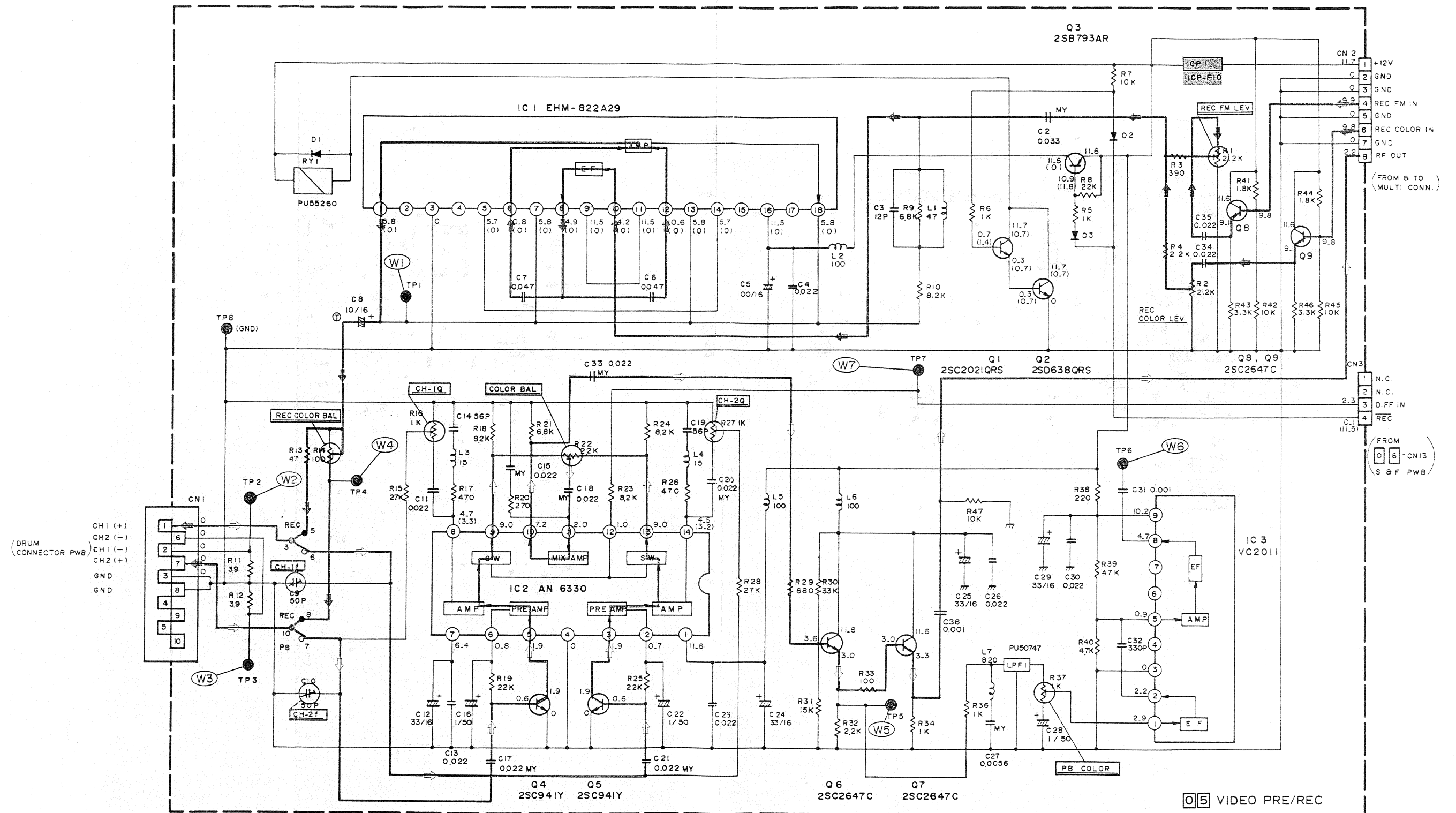


- NOTES: 1. NPN type transistors are DTC124EF.  
2. PNP type transistors are DTA124EF.

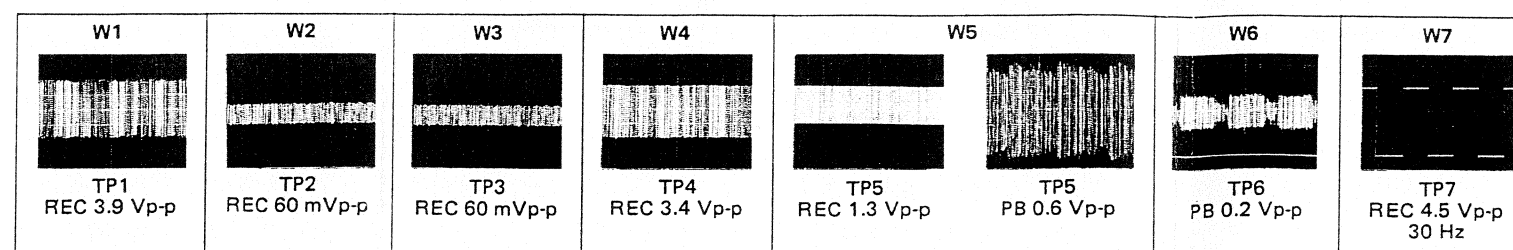
# 4.28 NORMAL AUDIO CIRCUIT BOARD



# 4.29 VIDEO PRE/REC SCHEMATIC DIAGRAM



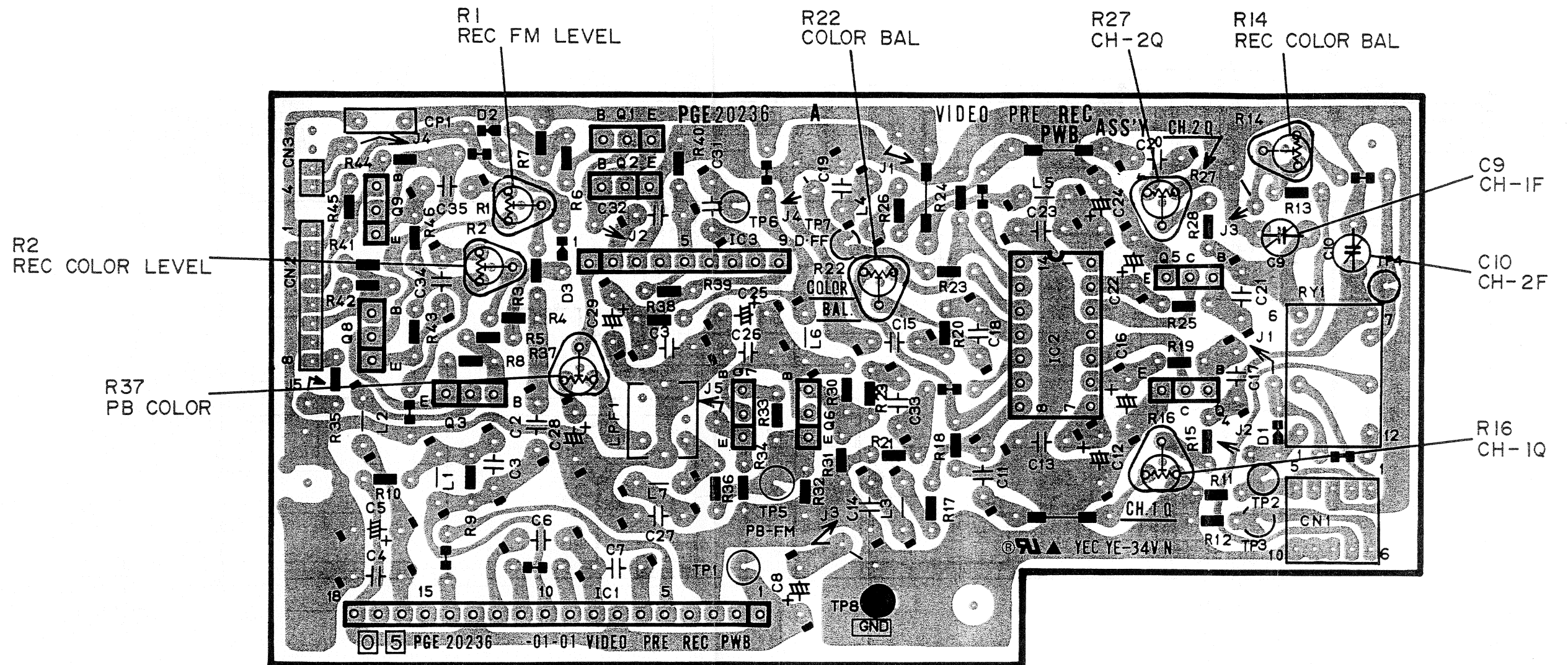
— MAIN WAVEFORMS OF VIDEO PRE/REC CIRCUIT —



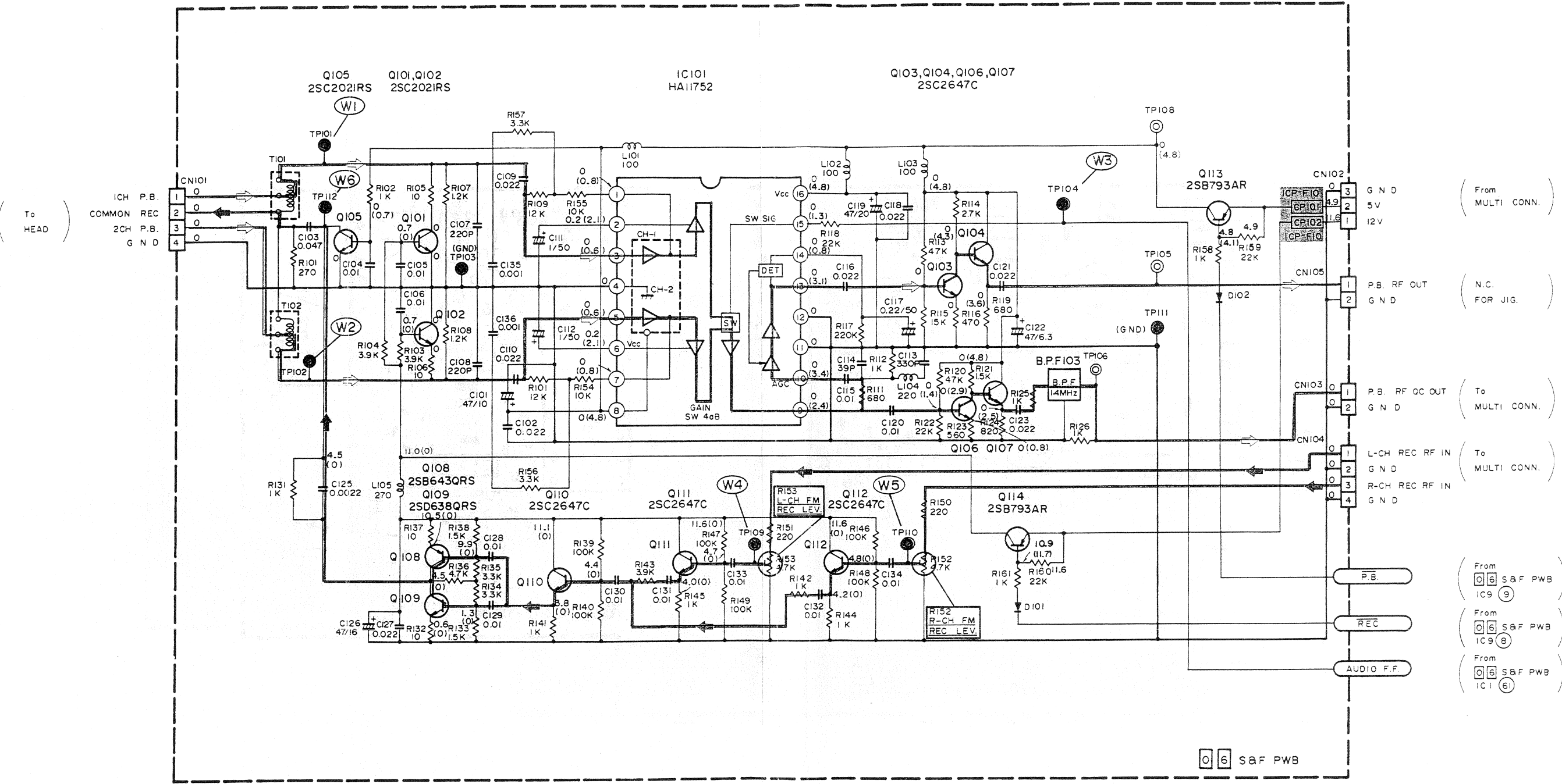
- NOTES: 1. DC voltages measured with digital voltmeter in REC mode.  
 2. Parentheses ( ) indicate play-back voltage then this differs from recording.



# 4.30 VIDEO PRE/REC CIRCUIT BOARD

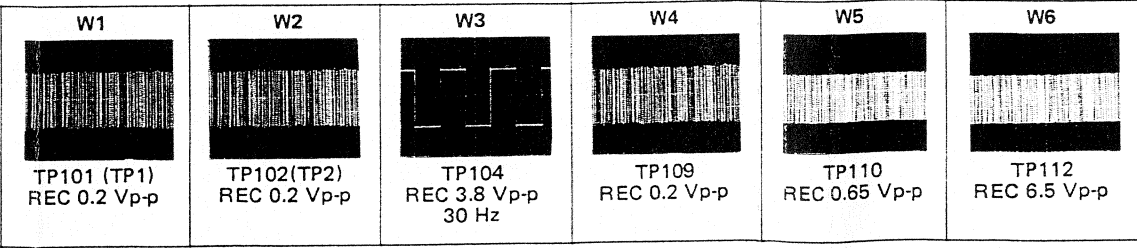


4.31 SERVO & FM AUDIO PRE/REC SCHEMATIC DIAGRAM (FM AUDIO PRE/REC)

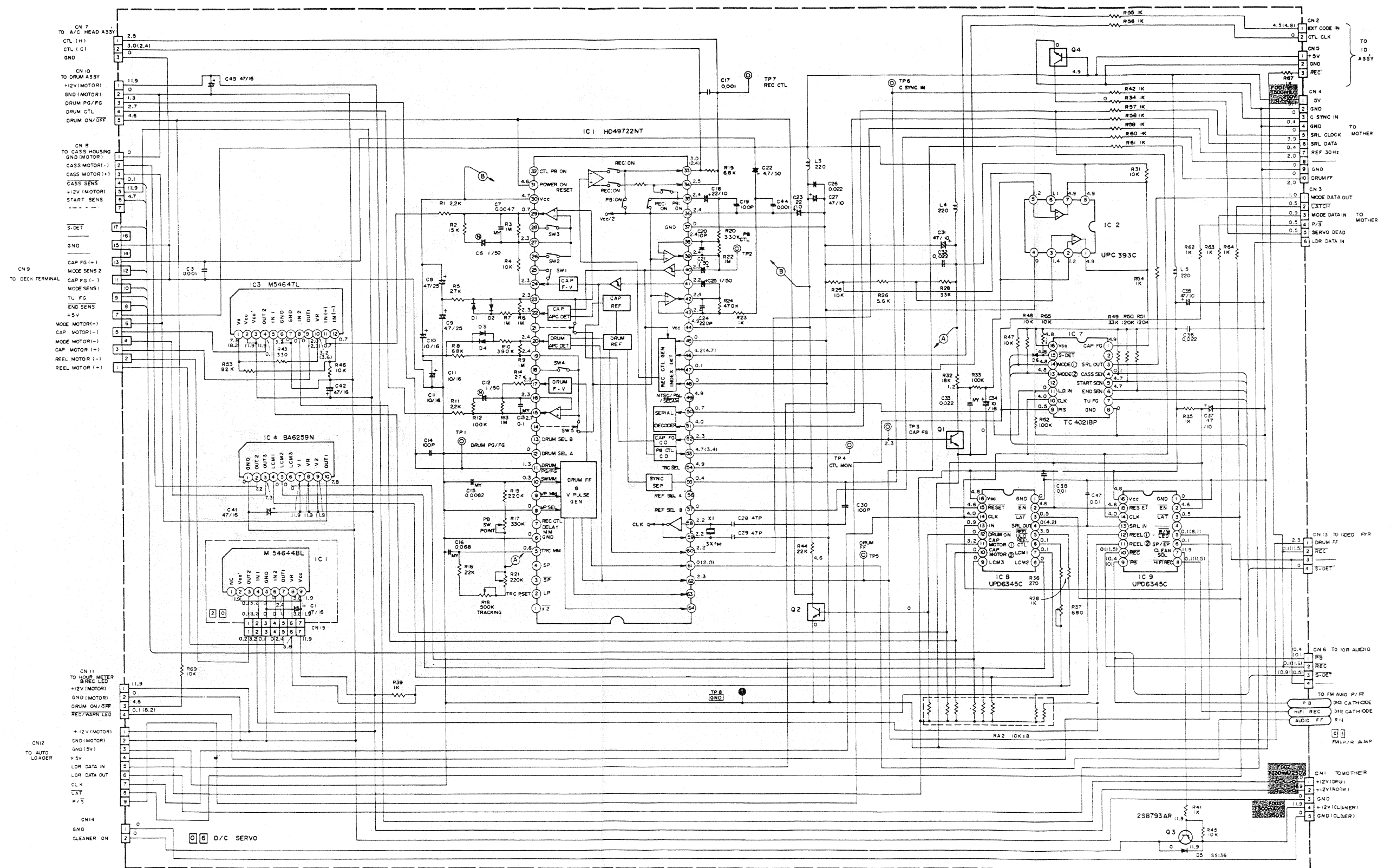


- NOTES: 1. DC voltages measured with digital voltmeter in REC mode.  
2. Parentheses ( ) indicate play-back voltage then this differs from recording.

— MAIN WAVEFORMS OF FM AUDIO PRE/REC CIRCUIT —



# 4.32 SERVO & FM AUDIO PRE/REC SCHEMATIC DIAGRAM (SERVO)



- NOTES:
1. NPN type transistors are DTC144EF.
  2. DC voltages measured with digital voltmeter in REC mode.
  3. Parentheses ( ) indicate play-back voltage then this differs from recording.



# 4.33 SERVO & FM AUDIO PRE/REC CIRCUIT BOARDS

— SERVO & FM  
AUDIO PRE/REC —

R18  
TRACKING

R21  
SUB TRACKING

R17  
PB SWITCH POINT

• VOLTAGE MEASURING  
POINTS

— FM AUDIO  
PRE/REC SECTION —

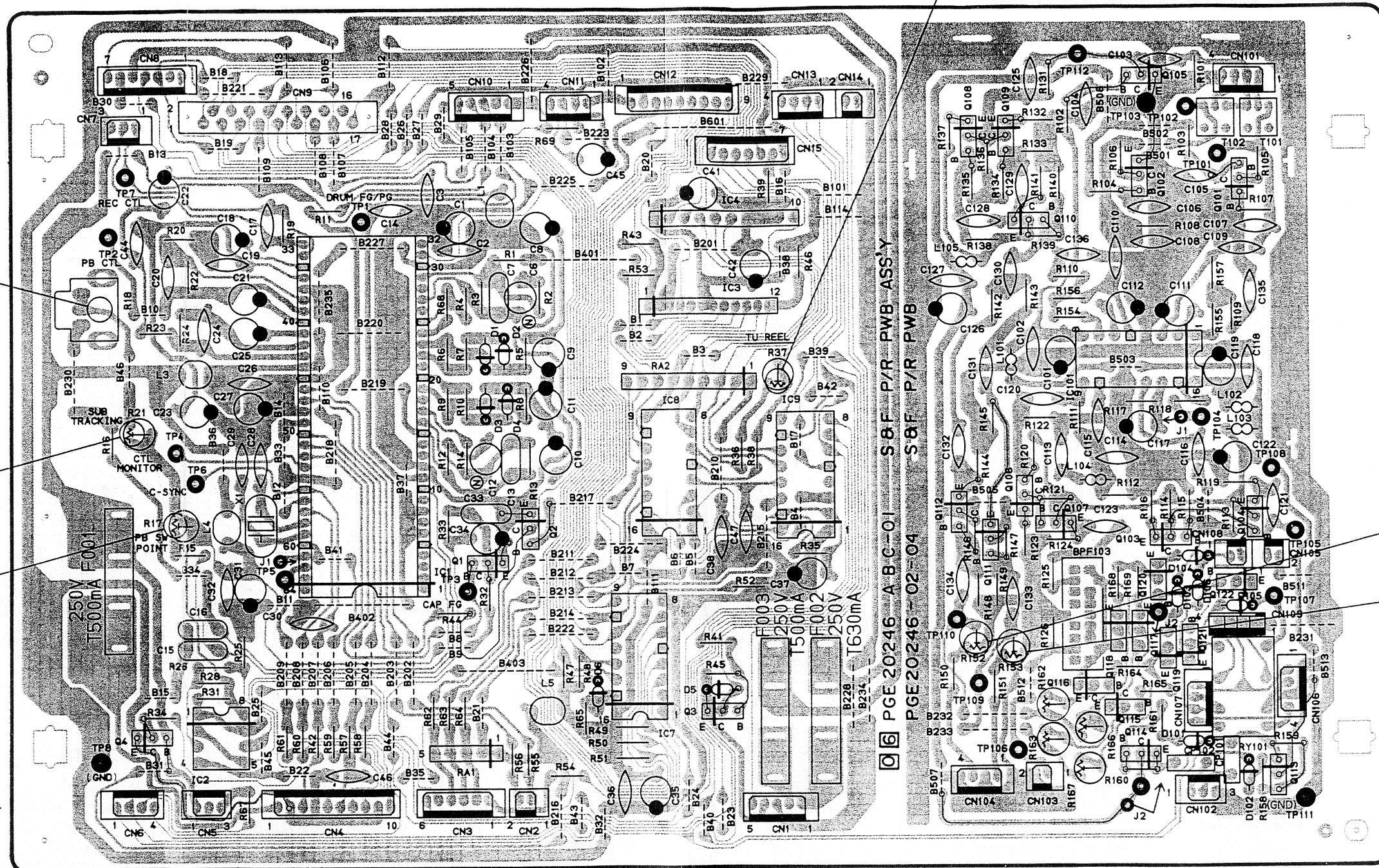
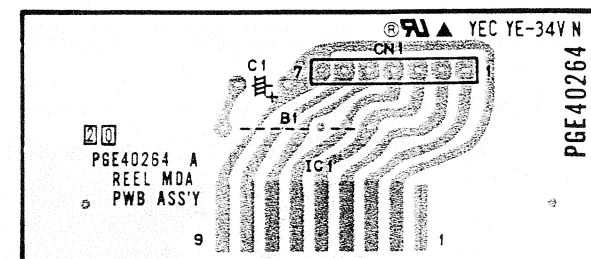
Symbol No.	Measuring point
Q101-E	GND
Q101-C	R105
Q101-B	C105
Q102-E	GND
Q102-C	R106
Q102-B	R104
Q103-E	R114
Q103-C	R115
Q103-B	R116
Q104-E	R119
Q104-C	R113
Q104-B	R115
Q105-E	GND
Q105-C	R131
Q105-B	R102
Q106-E	R123
Q106-C	R121
Q106-B	R120
Q107-E	R124
Q107-C	R121
Q107-B	R121
Q108-E	R137
Q108-C	R136

Symbol No.	Measuring point
Q108-B	R135
Q109-E	R132
Q109-C	R136
Q109-B	R134
Q110-E	R141
Q110-C	R139
Q110-B	R139
Q111-E	R145
Q111-C	R147
Q111-B	R147
Q112-E	R144
Q112-C	R146
Q112-B	R146
Q113-E	R158
Q113-C	B513
Q113-B	R158
Q114-E	R160
Q114-C	B507
Q114-B	R160

— SERVO SECTION —

Symbol No.	Measuring point
Q1-E	C34
Q1-C	R32
Q1-B	TP3
Q2-E	GND
Q2-C	R44
Q2-B	B217(IC8-12)
Q3-E	D5
Q3-C	D5
Q3-B	R45
Q4-E	GND
Q4-C	R34
Q4-B	B31(F001)

— REEL MDA —



A

B

C

4-36

4-36

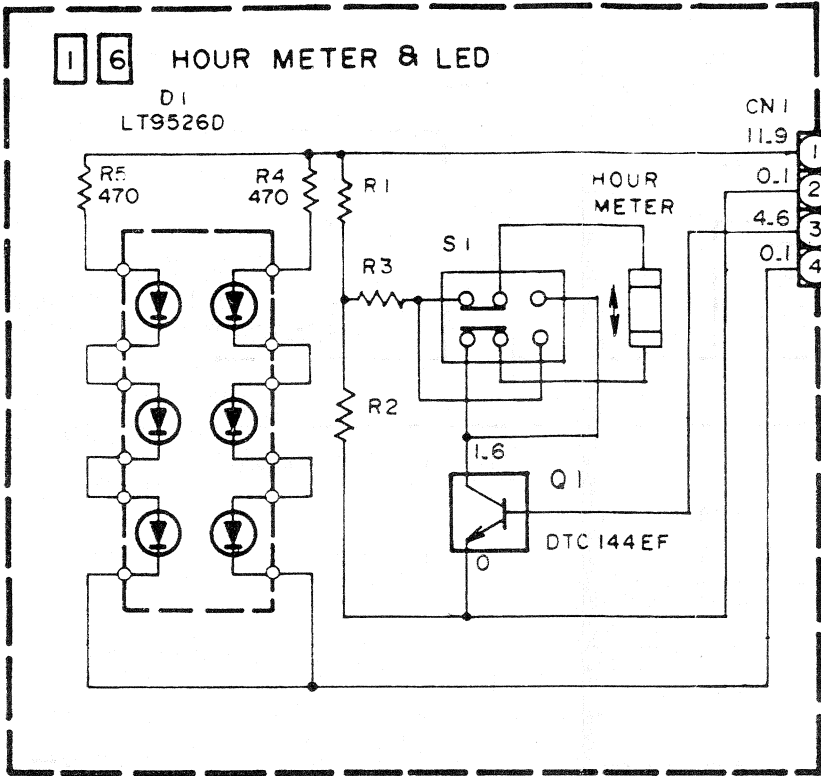
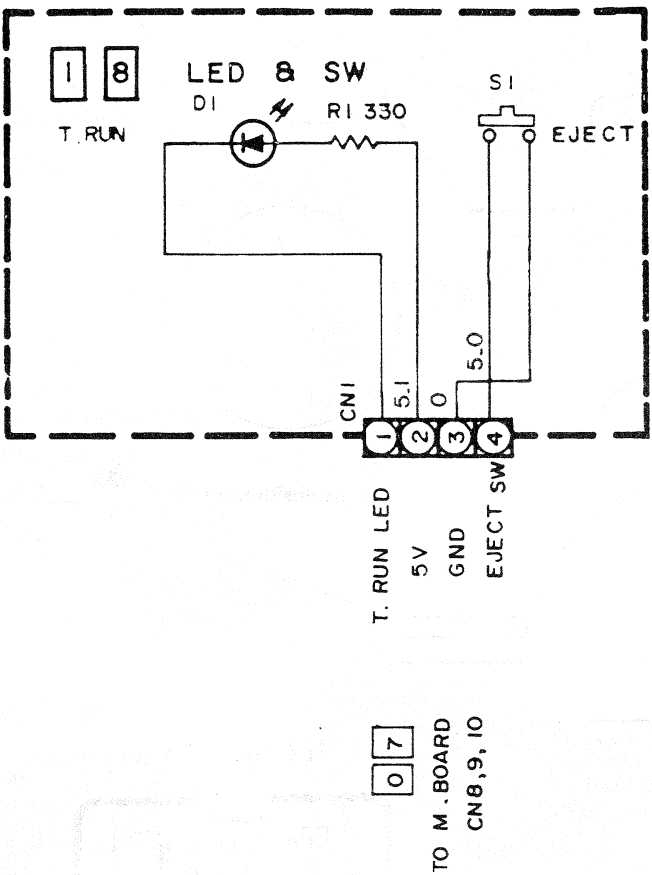
E

F

G

H

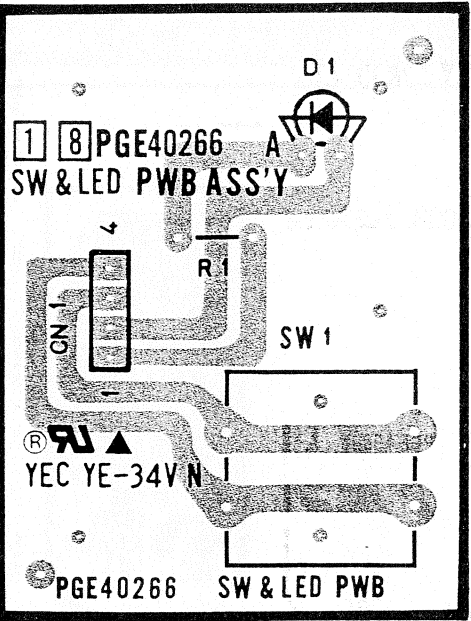
4.34 HOUR METER & LED, SW & LED SCHEMATIC DIAGRAMS



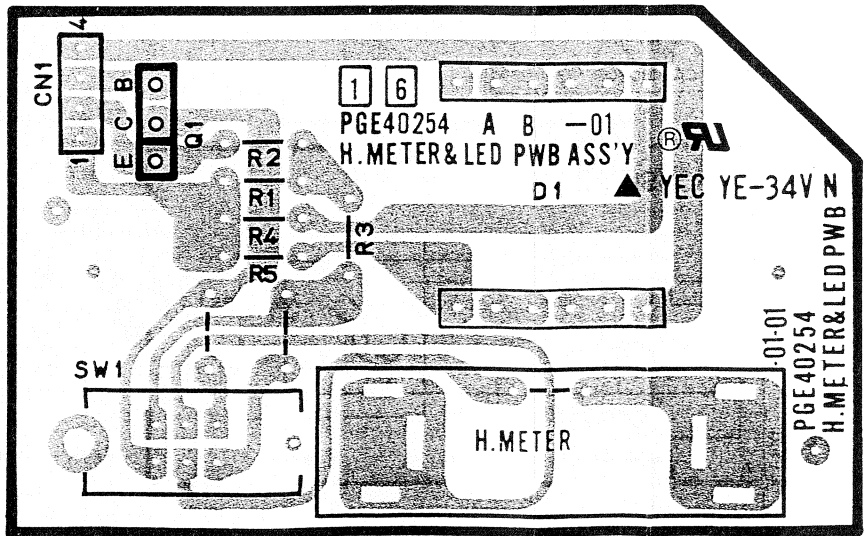
	BR-7030E (2000H)
R1	27KΩ
R2	3.9KΩ
R3	470KΩ

4.35 HOUR METER & LED, SW & LED CIRCUIT BOARDS

— SW & LED —

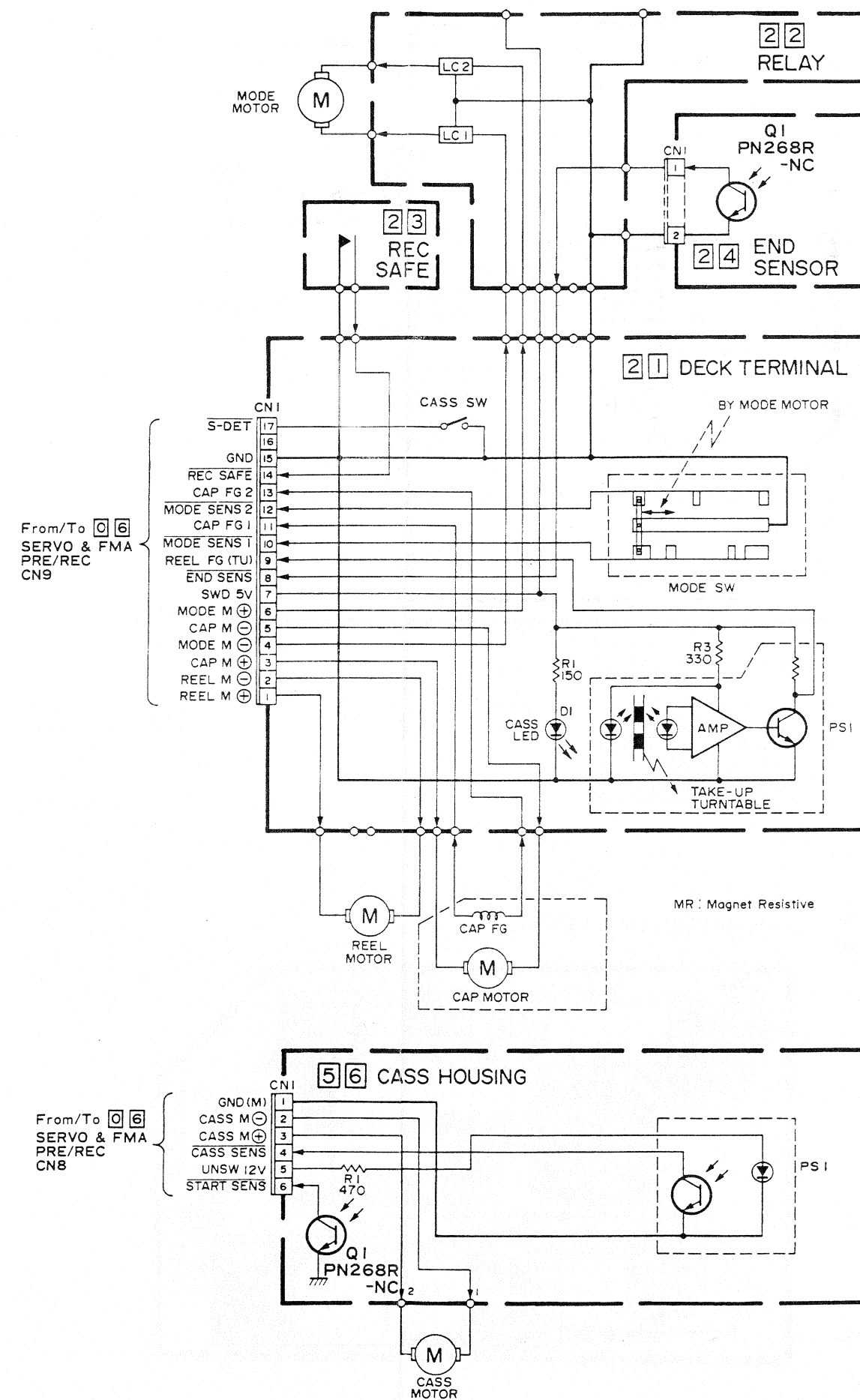


— HOUR METER & LED —

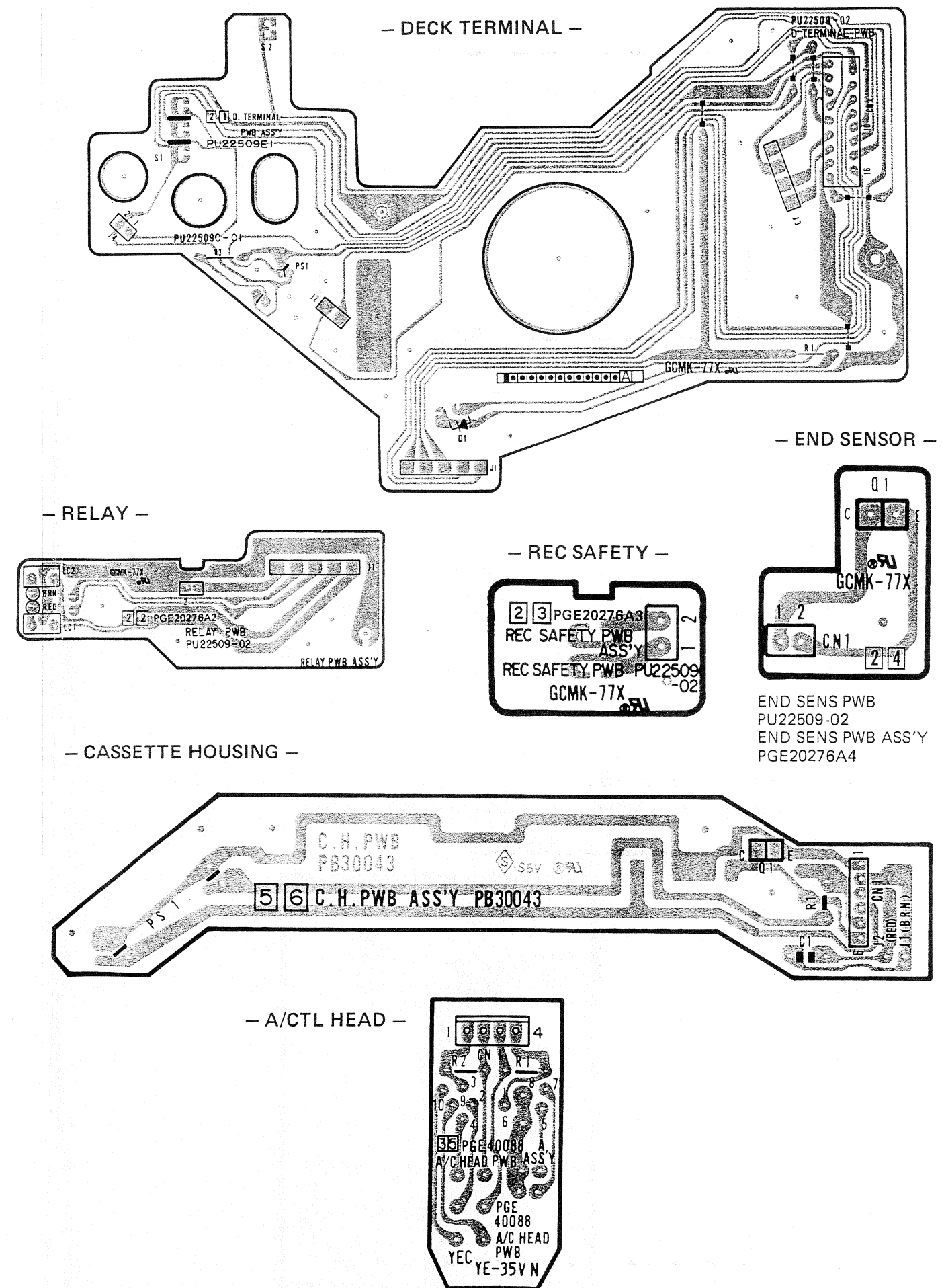




# 4.36 DECK TERMINAL SCHEMATIC DIAGRAMS



# 4.37 DECK TERMINAL CIRCUIT BOARDS



## 6





## 6



UID CODE DISPLAY

4

3

2

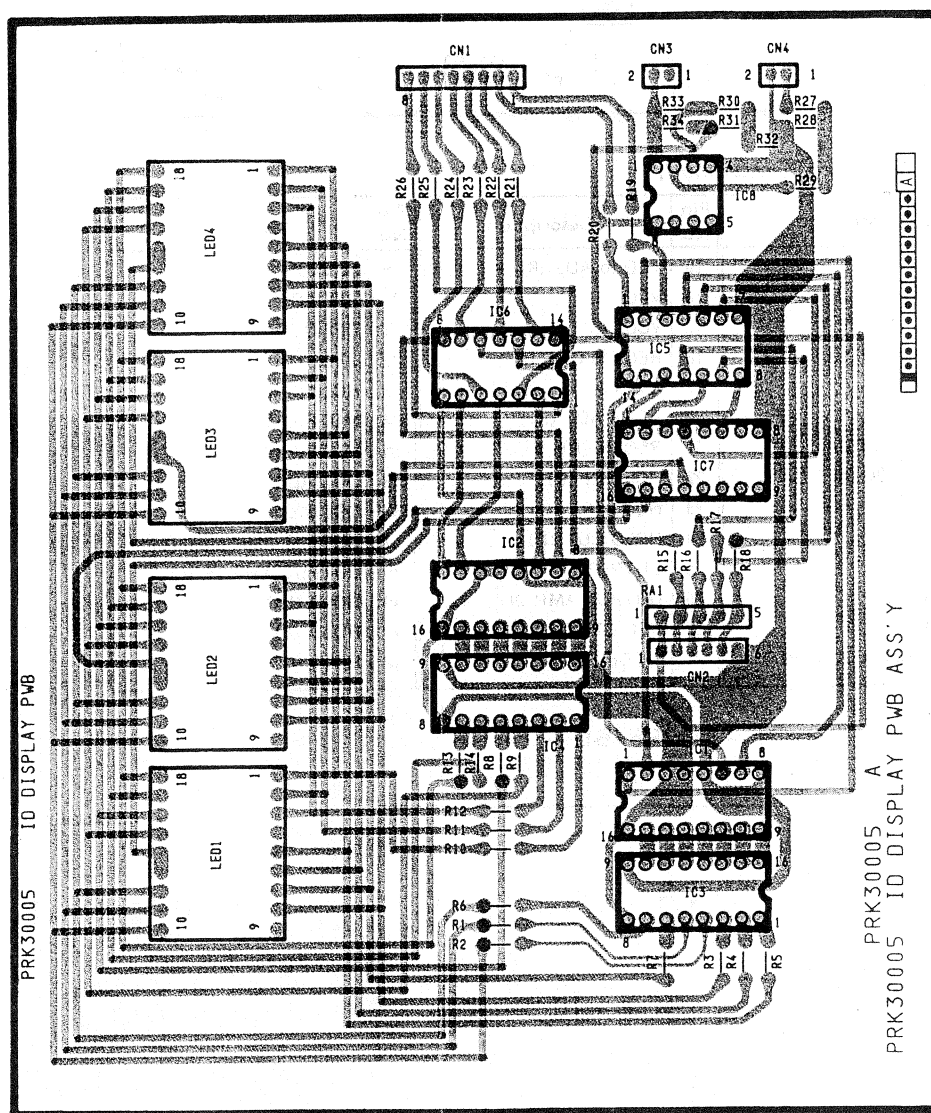
1

A

B

C

# 4.41 ID CODE DISPLAY CIRCUIT BOARD



## SECTION 5 EXPLODED VIEWS AND PARTS LIST

### SAFETY PRECAUTION

Parts identified by the  $\triangle$  symbol are critical for safety.

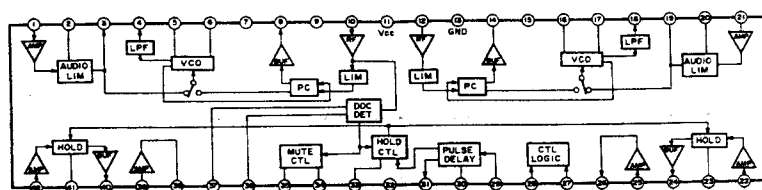
Replace only with specified part numbers.

	Page
5.1 STANDARD PART NUMBER CODING	
5.1.1 Screw coding	5-2
5.1.2 Fuse coding	5-2
5.2 EXPLODED VIEWS AND PARTS LIST	
5.2.1 Packing assembly	5-3
5.2.2 Cabinet assembly	5-4
5.2.3 Chassis assembly	5-6
5.2.4 Frame assembly	5-8
5.2.5 Power unit assembly	5-10
5.2.6 Rear bracket assembly	5-12
5.2.7 Mechanism unit assembly	5-14
5.2.8 Mechanism base assembly	5-15
5.2.9 Mechanism assembly	5-16

**Note:** For the mechanism of the mechanism units A, B and C, refer to three sections from 5.2.7 to 5.2.9 since it is common to the three units.

## 4.42 IC BLOCK DIAGRAMS

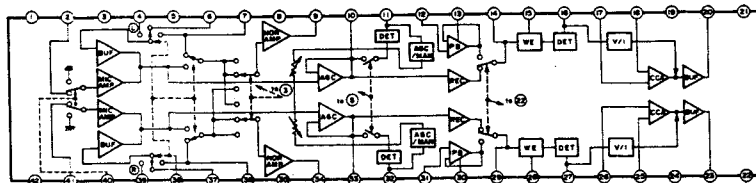
— AN3930K —  
VTR Stereo FM REC/PB Circuit



[AN3930K Terminal Description]

Pin No.	Description	Pin No.	Description	Pin No.	Description
1	REC IN (L)	15	VCO to ADJ (R)	29	FF IN
2	A LIM ADJ (L)	16	VCO (R)	30	DFF ADJ
3	A LIM MON (L)	17	VCO (R)	31	DFF OUT
4	REC FM OUT (L)	18	REC FM OUT (R)	32	$\frac{1}{2}$ Vcc
5	VCO (L)	19	A LIM MON (R)	33	HOLD TIME ADJ
6	VCO (L)	20	A LIM ADJ (R)	34	MUTE CTL OUT
7	VCO to ADJ (L)	21	REC IN (R)	35	MUTE TIME ADJ
8	FM DEMOD OUT (L)	22	HOLD IN (R)	36	DOC ADJ
9	GND (L)	23	HOLD (R)	37	DOC DET
10	RF IN (L)	24	HOLD OUT (R)	38	OUTPUT AMP OUT (L)
11	Vcc	25	OUTPUT AMP IN (R)	39	OUTPUT AMP IN (L)
12	RF IN (R)	26	OUTPUT AMP OUT (R)	40	HOLD OUT (L)
13	GND (R)	27	REC CTL	41	HOLD (L)
14	FM DEMOD OUT (R)	28	MODE CTL	42	HOLD IN (L)

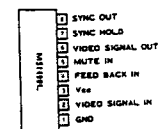
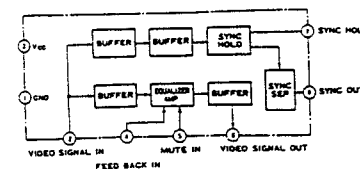
— AN6299NK —  
VTR Audio Signal Processing Circuit



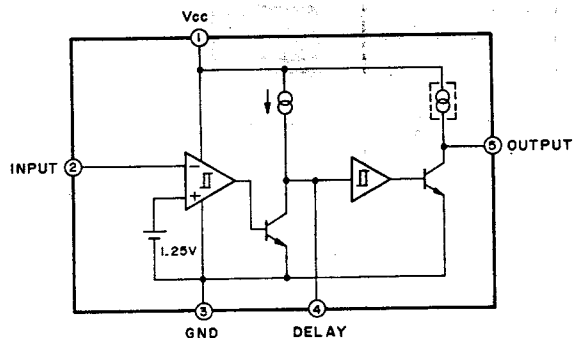
[AN6299NK Terminal Description]

Pin No.	Description	Pin No.	Description	Pin No.	Description
1	GND	14	ENCODE OUT	30	NR AMP
2	MIC (Lch) IN	15	WEIGHTING	31	PB IN
3	NORM AUDIO OUT CTL	16	NR DET OUT	32	AGC DET OUT
	Lch MODE H 9.8-12V	17	CCA + IN	33	ELEC. VR NR
	Rch MODE 3.8-7.7V	18	CCA - IN	34	NORM AUDIO OUT
	STEREO MODE 0-1.6V	19	CCA OUT	35	ELEC. VR CONTROL IN
4	AUX (Lch) IN	20	MONITOR (Lch) OUT	36	TV (Rch) IN
5	AGC ON/OFF	21	Vcc	37	CAMERA (Rch) IN
	ON H 5.2-12V	22	REC/PB CTL	38	INPUT SELECT
	OFF L 0-2.8V		REC L 0-6.4V		CAMERA H 11.5-12V
6	CAMERA (Lch) IN		PB H 9.1-12V		AUX MH 9.0-9.8V
7	TV (Lch) IN	23	MONITOR OUT		SC ML 5.5-6.8V
8	ELEC. VR CONTROL INPUT	24	CCA OUT		TV L 0-2.8V
9	NORM AUD. O (Lch) OUT	25	CCA - IN	39	AUX (Rch) IN
10	ELEC. VR NF	26	CCA + IN	40	MIC OUT CTL
11	AGC DET OUT	27	NR Det		OFF H 10-12V
12	PB AUDIO (Lch) IN	28	WAITING		Rch ON M 4.4-8.0V
13	NR AMP	29	ENCODE OUT	41	MIC (Rch) IN
				42	STANDARD VOLTAGE

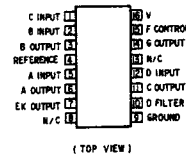
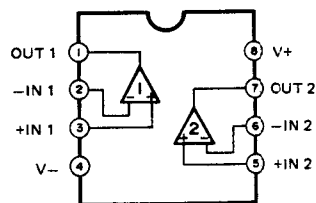
— M51490L —  
Video Equalizer



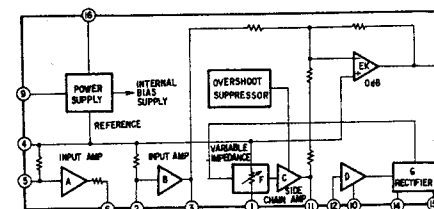
— M51957BL —



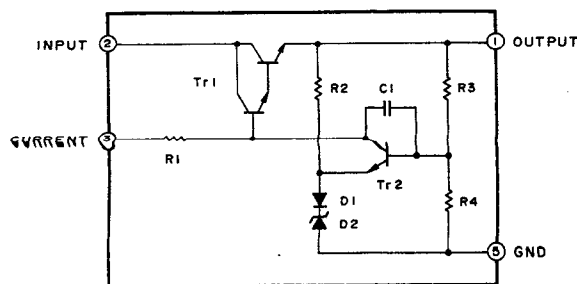
— M5218P —  
Dual Low Noise Operational Amplifier



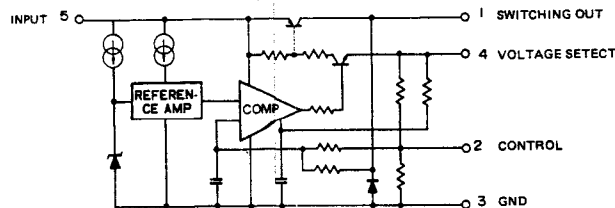
— NE650N —  
Dolby B Type Noise Reduction Circuit



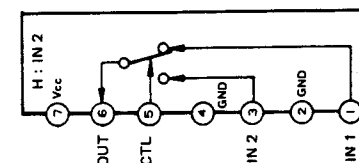
— STK5730 —



— STR2012A —  
Chopper Regulator



— TA7347P —  
2-Input Switch





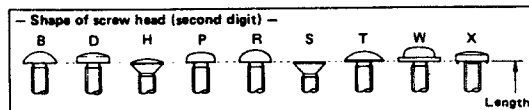
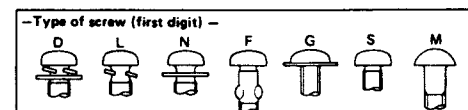
### 5.1.1 Screw coding

The diagram shows a screw with the following numbered callouts:

- 1**: Type of screw (in capital letters)
- 2**: Shape of screw head (in capital letters)
- 3**: Material (in capital letters)
- 4**: Shape of thread (in capital letters)
- 5**: Nominal diameter (in figures)
- 6**: Nominal diameter (in figures)
- 7**: Length (in figures)
- 8**: Length (in figures)
- 9**: Surface treatment (in capital letters)

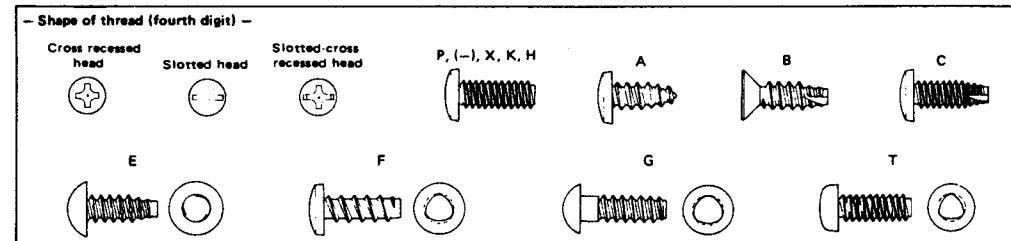
- S Normal screws
- D Assembled machine screws (with plain and spring washers)
- L " (with spring washer)
- N " (with plain washer)
- F Feather screws
- G Washer head tapping screws
- M Wood screws

B	Brazier head	W	Washer head (machine screws)
D	Binding head	X	Toothed head
H	Oval countersunk head		
P	Pan head		
R	Round head		
S	Flat head		
T	Truss head		



S Steel	N Nickel silver
E Stainless steel	Y Cast brass
C Cast iron	A Aluminum
U Copper	Z Zinc alloy
B Brass	K Polycarbonate
P Phosphor bronze	

P	Cross recessed head screws	
(-)	Slotted head machine screws	
X	Slotted-cross recessed head machine screws	
K	Cross recessed head machine screws for precision equipment (type 1)	
H	"	(type 3)
A	Cross recessed head tapping screws (type 1)	
B	"	(type 2)
C	"	(type 3)
E	Cross recessed head special tapping screws (brand : evertight)	
F	"	(brand : P-tight)
T	"	(brand : taptight)
G	"	

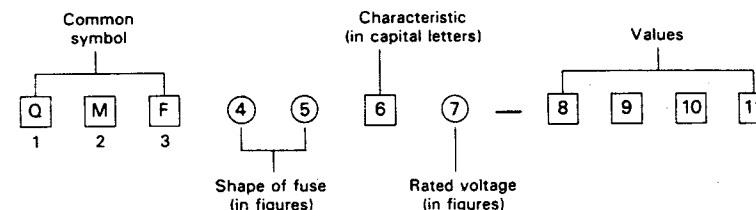


The fifth and sixth digits are numbers indicating a nominal diameter or dimension. If the dimension exceeds 10 mm, three digits are used. The number indicates a nominal diameter or dimension, given in millimeters, multiplied by ten.

The seventh and eighth digits are numbers indicating length in millimeters. The preceding figure is zero when the dimension is smaller than 10 mm. For machine screws used in precision equipment whose length is given in units of 0.1 mm, the number indicates ten times the size of their length.

- Z Dichromate treatment after galvanizing (MFZn II-C)
- N Nickel plating (MFNi II, MFNi I)
- R Chromium plating (MBCr II, MBCr I)
- G Silver plating (SP4)
- B Black coating after plating
- F Blackening of iron (FB)
- M Blackening after galvanizing
- K Pickling of brass (PF2)
- P Phosphate treatment
- W Uni-chrome plating
- L Coating with transparent paint
- A Coloring red after galvanizing (MFZn II-C)
- C Coloring blue after galvanizing (MFZn II-C)
- T Coloring green after galvanizing (MFZn II-C)
- V Coloring purple after galvanizing (MFZn II-C)

**Standard fuse part numbers are as follows.**



51	φ5.2 × 20 mm
60	φ6.4 × 30 mm
61	φ6.35 × 31.8 mm
63	φ6.4 × 30 mm with lead wires
66	φ6.35 × 31.8 mm with lead wires
00	Special type

- 1 AC125 V
- 2 AC250 V
- 3 0.1—1 A : AC250 V  
1.25—6.3 A : AC125 V

R63	.....	0.63 A
1R0	.....	1.0 A
2R5	.....	2.5 A
100	.....	10 A
R315	.....	0.315 A
1R25	.....	1.25 A

Symbol	Fusing Current	Fusing Time	Remarks
A	210 %	Within 2 min.	Anti-rush type (for Europe)
	275 %	0.6 — 10 sec.	
	400 %	0.15 — 3 sec.	
	1000 %	0.02 — 0.3 sec.	
B	210 %	Within 30 min.	Regular fusible type (for SEMKO, Europe)
	275 %	0.05 — 2 sec.	
	400 %	0.01 — 0.3 sec.	
C	135 %	Within 1 hr.	Regular fusible type (for UL, Japan)
	200 %	Within 2 min.	
E	210 %	Within 2 min.	Anti-rush type (for Europe)
	275 %	0.6 — 10 sec.	
	400 %	0.15 — 3 sec.	
	1000 %	0.02 — 0.3 sec.	
J	135 %	Within 1 hr.	Anti-rush type
	200 %	Within 2 min.	
M	135 %	Within 1 hr.	Regular fusible type (for UL)
	200 %	Within 2 min.	
R	160 %	Within 1 hr.	Regular fusible type
	200 %	Within 2 min.	
S	160 %	Within 1 hr.	Anti-rush type
	200 %	Within 2 min.	
	700 % — 2000 %	Within 0.01 sec.	
U	135 %	Within 1 hr.	Anti-rush type (for UL)
	200 %	Within 2 min.	
	800 % — 2000 %	Within 0.01 sec.	



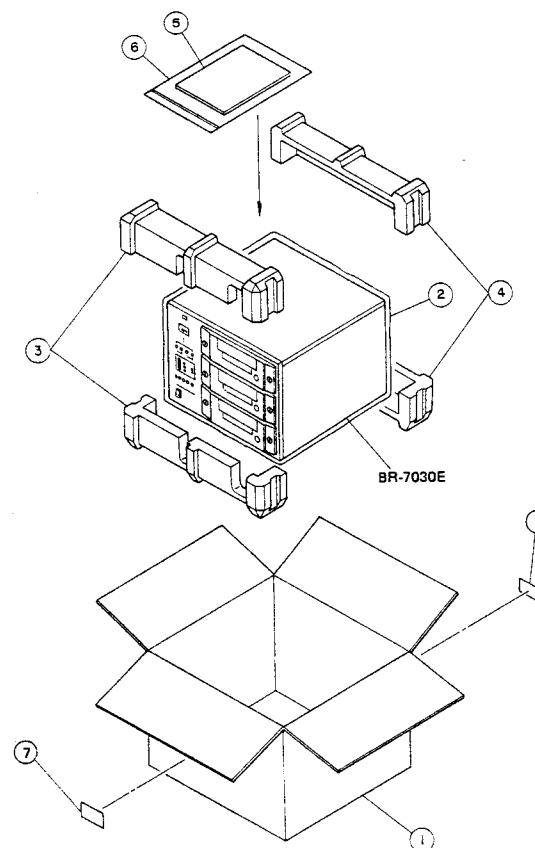
## 5.2 EXPLODED VIEWS AND PARTS LIST

### 5.2.1 Packing assembly <M1>

When shipped from the factory the switches and VR's are set as shown below tables.

FRONT PANEL	POSITION
AUDIO REC LEVEL VR: Hi-Fi (L)	CENTER
: Hi-Fi (R)	CENTER
: NORM (L)	CENTER
: NORM (R)	CENTER
METER SELECT SW	Hi-Fi (L)
TEST POINT SELECT SW	B
POWER SW	OFF
DIRECTION SW (with A,B,C unit)	▶

REAR PANEL	POSITION
NR SW	OFF
Hi-Fi REC SW	ON
AGC SW	ON
LIMITER SW	OFF
SYNC	VIDEO
EXT CODE	OFF
AUDIO INPUT SELECT SW	SEPA
V SELECTOR	240 V

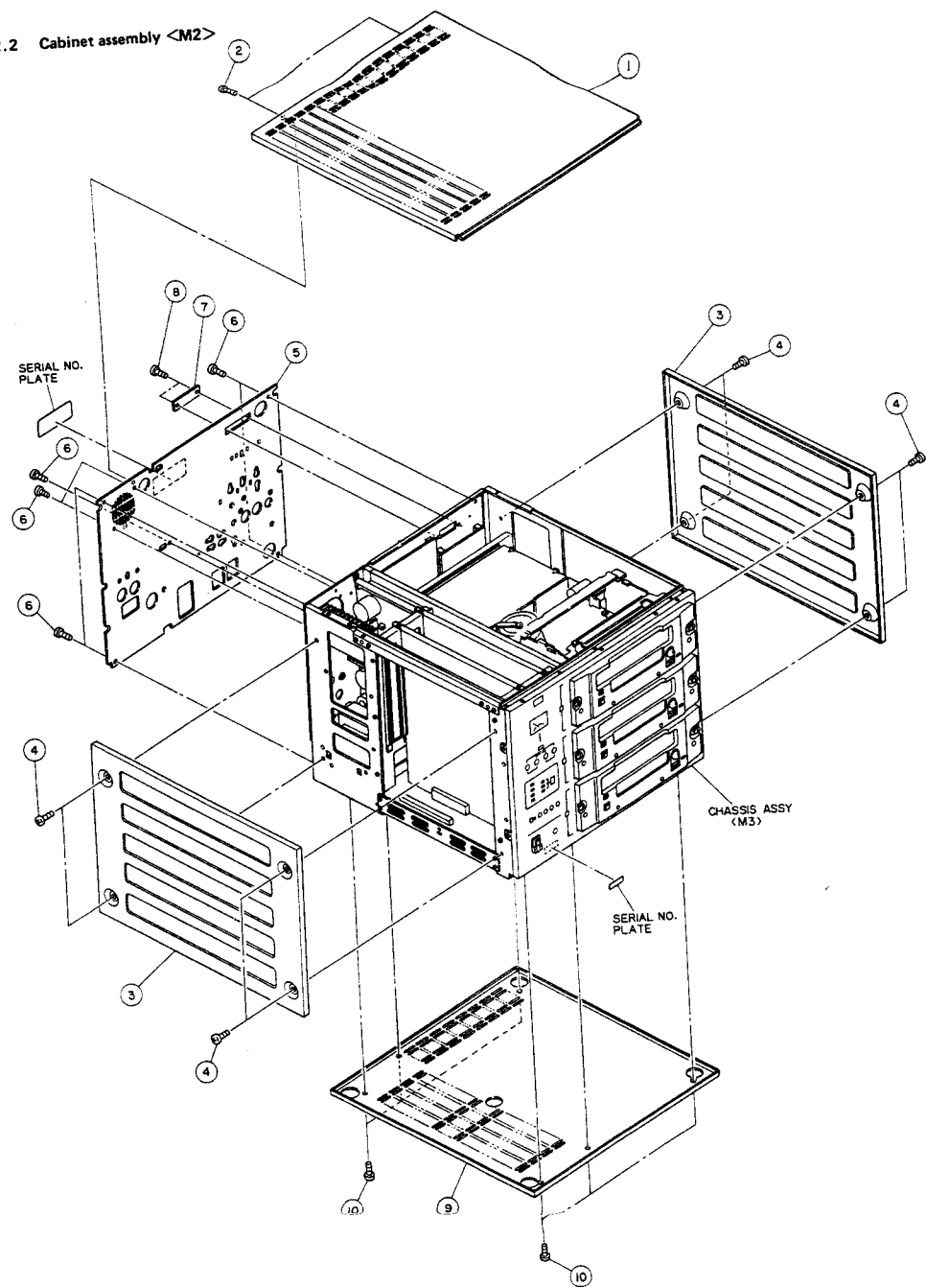


#	REF NO.	PART NO.	PART NAME, DESCRIPTION
*****			

\*\*\*\*\*  
 \* 1. PACKING ASSEMBLY <M1> \*  
 \*\*\*\*\*

1	PRD20187-03	PACKING CASE
2	PGD30005-05	PE BAG
3	PRD20188	CUSHION, FRONT
4	PRD20189	CUSHION, REAR
5	PGD30002-156	INSTRUCTIONS
6	QPG8024-03404	POLY BAG
7	PUP40619	SERIAL NO. STICKER, X2

5.2.2 Cabinet assembly <M2>



# REF NO. PART NO. PART NAME, DESCRIPTION

\*\*\*\*\*

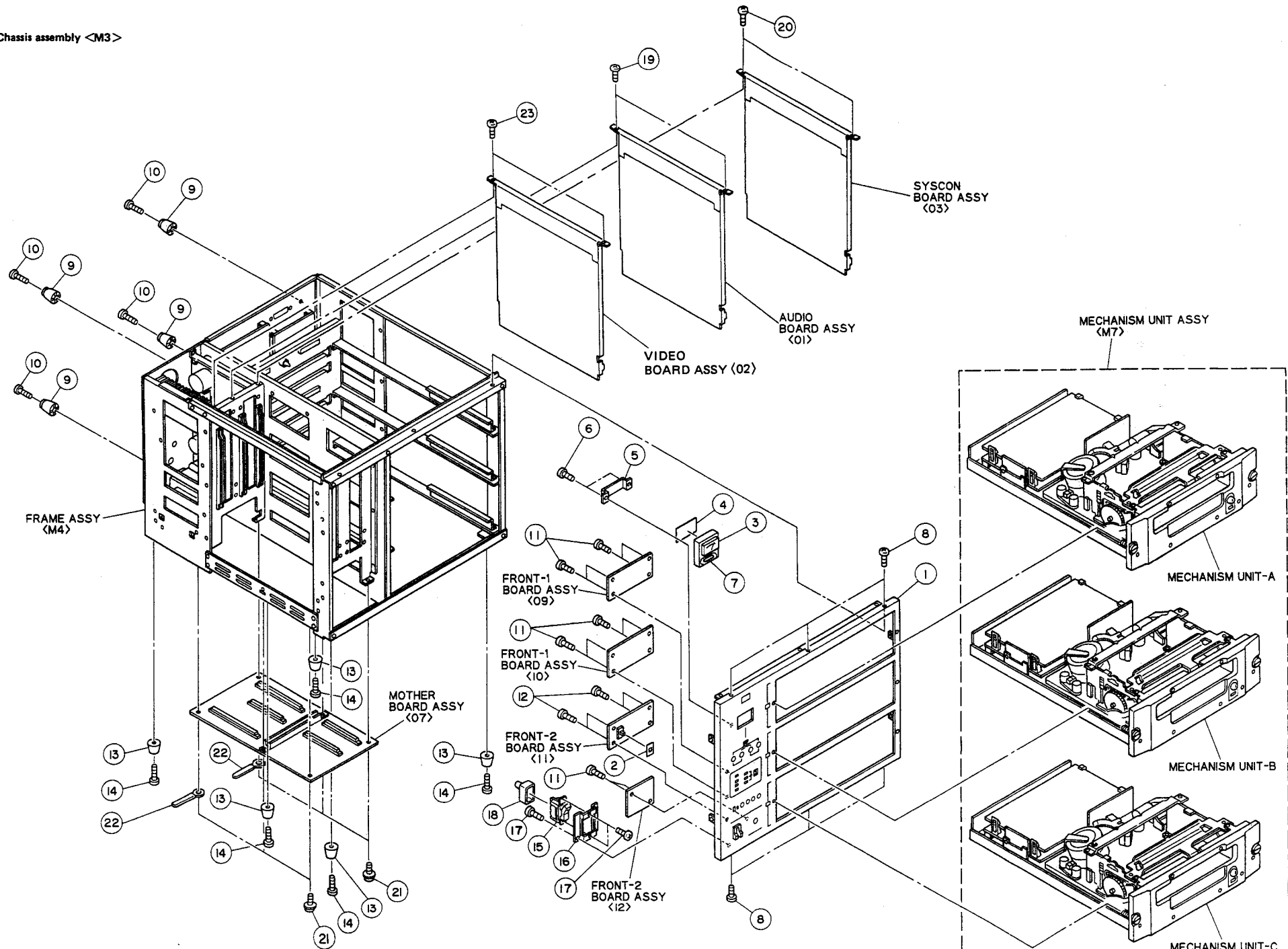
\*\*\*\*\*  
\* 2. CABINET ASSEMBLY <M2> \*  
\*\*\*\*\*

1	PRD10124	TOP COVER
2	SDSP3006R	SCREW, X2
3	PRD10125	SIDE COVER, X2
4	SDSP4006R	SCREW, X8
5	PRD10127-03-03	REAR COVER
6	SDSP3006M	SCREW, X7
7	PRD42561	PLATE
8	SDSP3006M	SCREW, X2
9	PRD10128	BOTTOM COVER
10	SBST3006Z	TAPPING SCREW, X6

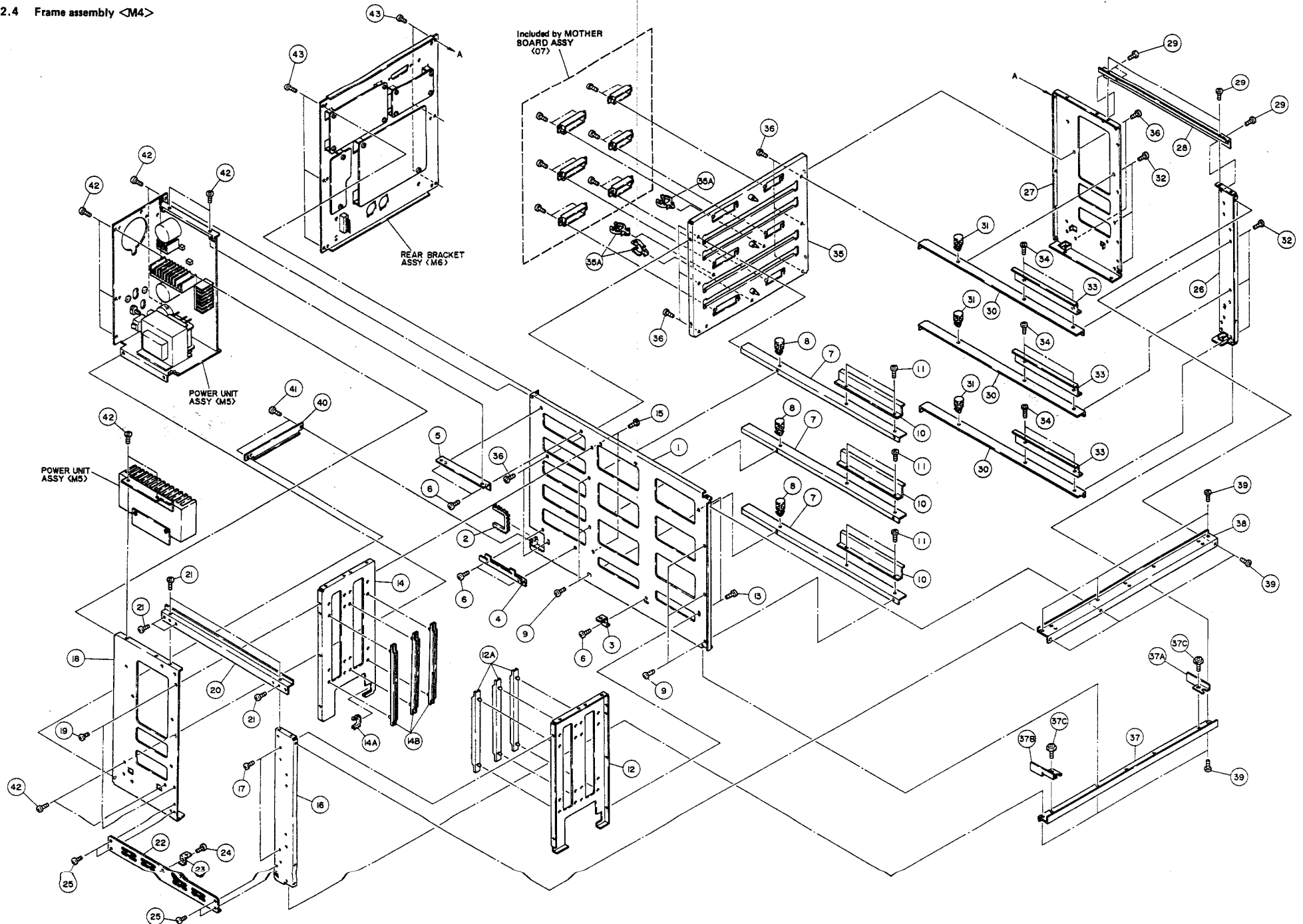
### 5.2.3 Chassis assembly <M3>

#	REF NO.	PART NO.	PART NAME, DESCRIPTION
*****			
*****			
* 3. CHASSIS ASSEMBLY <M3> *			
*****			
1	PRD10122C	FRONT PANEL ASSY	
2	PGD41135	SHEET	
3	PGZ01244-07	METER	
4	PGD40056	CUSHION	
5	PRD42396-01-03	METER BRACKET	
6	LPSP3004Z	SCREW, X2	
7	PGZ01087-LAMP	METER LAMP	
8	SDSP3006R	SCREW, X6	
9	QZF2319-001	FOOT, X4	
10	SDBP4018M	SCREW, X4	
11	DPSP3006Z	SCREW, X10	
12	SPSP3004Z	SCREW, X4	
13	QZF2115-002	FOOT, X5	
14	SBST3010Z	TAPPING SCREW, X5	
15	QSE2A21-L01	POWER SW	
16	PRD42552	SW BRACKET	
17	LPSP3006Z	SCREW, X4	
18	PRD42023	SW COVER	
19	SBST3006Z	SCREW, X2	
20	SBST3006Z	SCREW, X2	
21	GBST3006Z	TAPPING SCREW, X6	
22	PU49485-4	WIRE CLAMP, X2	
23	SBST3006Z	SCREW, X2	

Chassis assembly <M3>



## 5.2.4 Frame assembly <M4>



# REF NO. PART NO. PART NAME, DESCRIPTION

\*\*\*\*\*  
 \* 4. FRAME ASSEMBLY <M4> \*  
 \*\*\*\*\*

1	PRD10117	CENTER STAY
2	PU43172-9-095	NYLON GROMMET
3	PRD42514	BRACKET(B)
4	PRD42515	BRACKET(C)
5	PRD42516	BRACKET(D)
6	SBST3006Z	TAPPING SCREW, X5
7	PRD20170-02-01	GUIDE RAIL BRACKET, X3
8	PGZ01128	SPACER, X3
9	SBST3006Z	TAPPING SCREW, X6
10	PRD42513	BRACKET(A), X3
11	SBST3006Z	TAPPING SCREW, X6
12	PRD20174A-02	GUIDE BRACKET ASSY
12A	PGZ00493-03	GUIDE RAIL, X3
13	SBST3006Z	TAPPING SCREW, X2
14	PRD20175A-02	GUIDE BRACKET ASSY, REAR
14A	PU43172-1-40	N GROMMET
14B	PGZ00493-03	GUIDE RAIL, X3
15	SBST3006Z	TAPPING SCREW, X2
16	PRD20184B	FRONT BRACKET ASSY, LEFT
17	SBST3006Z	TAPPING SCREW, X2
18	PRD10135B	REAR BRACKET(A) ASSY
19	SBST3006Z	TAPPING SCREW, X2
20	PRD20169	UPPER STAY
21	SBST3006Z	TAPPING SCREW, X5
22	PRD30382	LOWER STAY
23	PRD42514	BRACKET(B)
24	SBST3006Z	TAPPING SCREW
25	SBST3006Z	TAPPING SCREW, X4
26	PRD20184A	FRONT BRACKET ASSY, RIGHT
27	PRD10135A	REAR BRACKET(A) ASSY
28	PRD20169	UPPER STAY
29	SBST3006Z	TAPPING SCREW, X5
30	PRD20170-01-01	GUIDE RAIL BRACKET, X3
31	PGZ01128	SPACER, X3
32	SBST3006Z	TAPPING SCREW, X6
33	PRD42513	BRACKET(A), X3
34	SBST3006Z	TAPPING SCREW, X6
35	PRD30385A	CONNECTOR BRACKET ASSY
35A	PU50259	STAND OFF CLIP, X3
36	SBST3006Z	SCREW, X10
37	PRD20191A	FRONT STAY ASSY
37A	PRD42582	BRACKET
37B	PRD42582-02	BRACKET
37C	DPSP3006Z	SCREW, X2
38	PRD20167	FRONT STAY
39	SBST3006Z	TAPPING SCREW, X9
40	PRD42553	BRACKET
41	SBST3006Z	TAPPING SCREW, X2
42	SBST3006Z	TAPPING SCREW, X12
43	SBST3006Z	TAPPING SCREW, X6

# 5.2.5 Power unit assembly <M5>

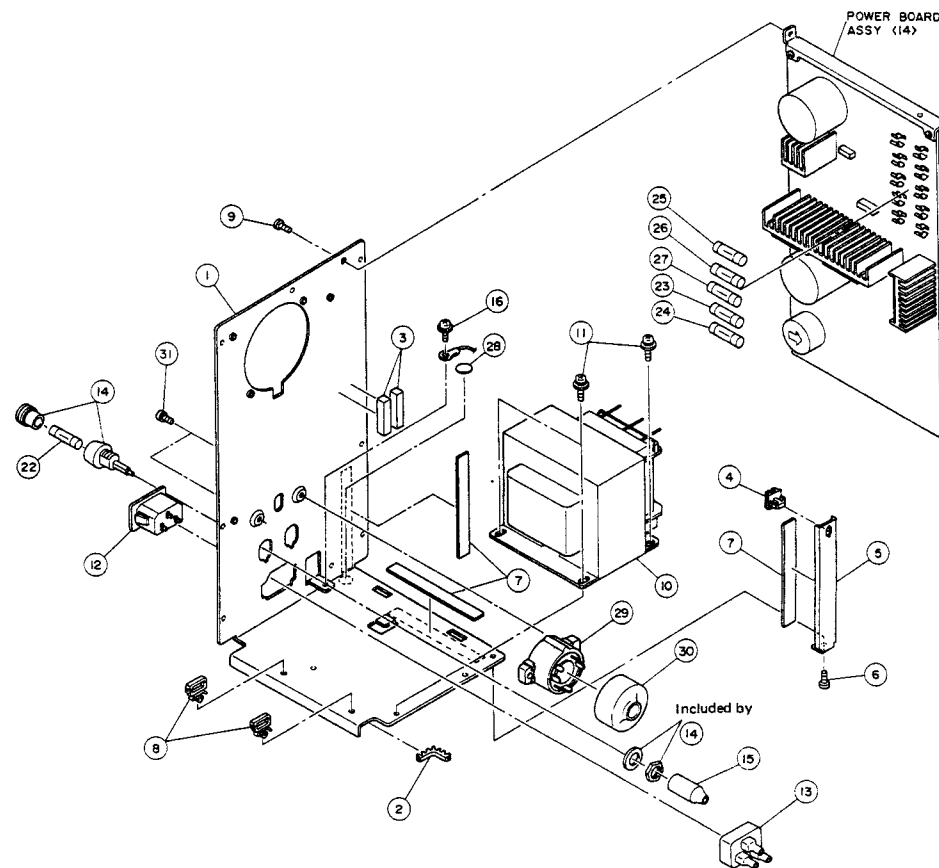
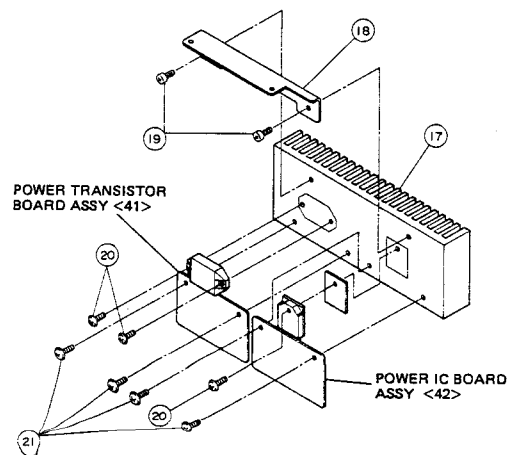
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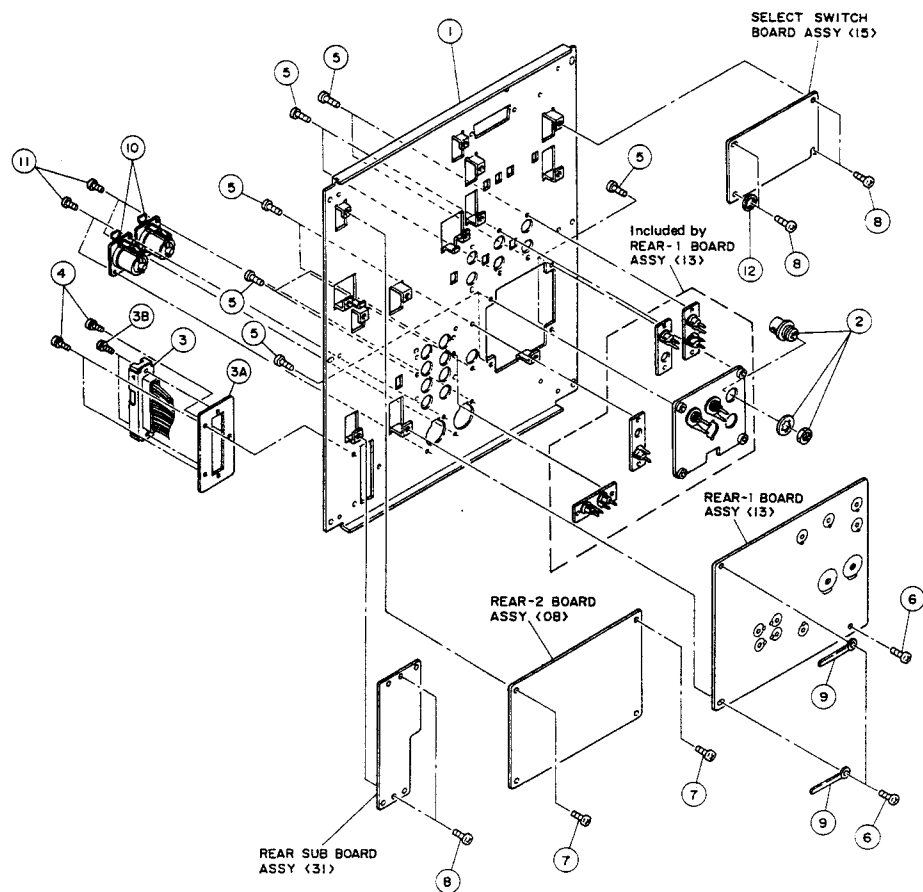
## \*\*\*\*\* \* 5. POWER UNIT ASSEMBLY <M5> \* \*\*\*\*\*

1	PRD20173-01-01	POWER BRACKET
2	PU43172-9-20	NYLON GROMMET
3	PRD30030-11	PAD, X2
4	PGZ00086	PWB HOLDER
5	PGD41197	BRACKET
6	SBST3006Z	TAPPING SCREW
7	PGD41199	SHEET, X3
8	PGZ00452	L WIRE SADDLE, X2
9	SBST3006Z	TAPPING SCREW
10	PGZ01185	POWER TRANSFORMER
11	DPSP4010Z	SCREW, X3
12	PGZ00760	AC INLET
13	PU52931	CONNECTOR COVER
14	QMG0301-004	FUSE HOLDER
15	PU50316	FUSE COVER
16	DPSP4008N	SCREW
17	PRD42637	HEAT SINK
18	PRD42543	HEAT SINK BRACKET
19	LPSP3008Z	SCREW, X2
20	SDSP3012Z	SCREW, X3
21	GBST3008Z	TAPPING SCREW, X4
22	QMF51E2-1R25	FUSE, F1
23	QMF51E2-4R0	FUSE, F01
24	QMF51E2-R80	FUSE, F02
25	QMF51E2-4R0	FUSE, F03
26	QMF51E2-R80	FUSE, F04
27	QMF51E2-1R0	FUSE, F05
28	PU44457	STICKER
29	QSR0085-004	V SELECTOR
30	PU54680	V SELECTOR COVER
31	LPSP3006Z	SCREW, X2

Power unit assembly <M5>



# 5.2.6 Rear bracket assembly <M6>



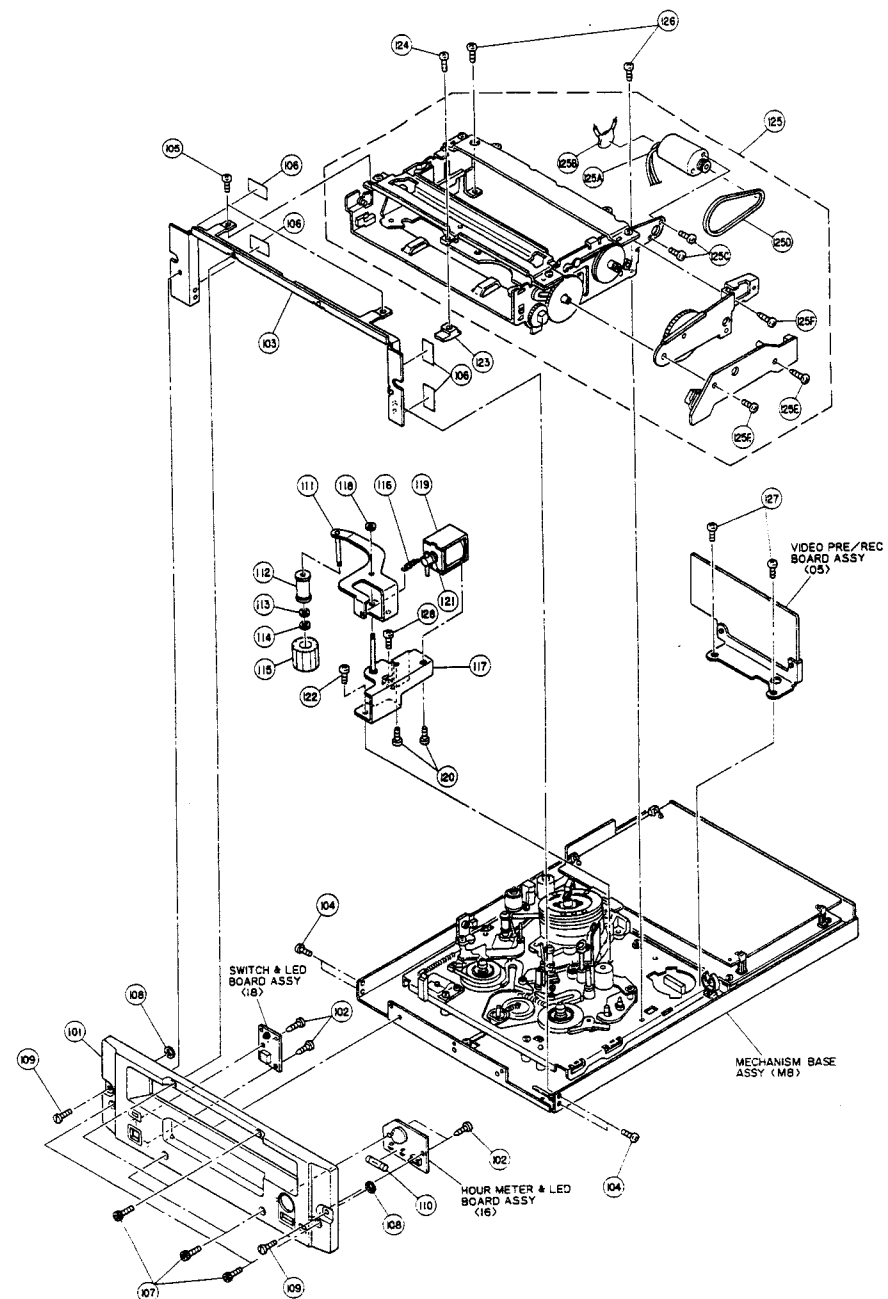
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 \* 6. REAR BRACKET ASSEMBLY <M6> \*  
 \*\*\*\*\*

1	PRD20172-01-02	REAR BRACKET(B)
2	PGZ00173	7P CONNECTOR
3	PGD40262D	34P CONNECTOR ASSY, REMOTE
3A	PGD40121-2	PLATE
3B	LPSP2610Z	SCREW, X2
4	LPSP3006Z	SCREW, X3
5	LPSP3008Z	SCREW, X16
6	GBST3006Z	TAPPING SCREW, X3
7	GBST3006Z	SCREW, X2
8	GBST3006Z	SCREW, X6
9	PU49485-4	WIRE CLAMP, X2
10	PGZ00438	XLR CONNECTOR, X2(HI-FI)
11	SPBP2606R	SCREW, X4
12	Q03093-501	NYLON WASHER





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*****
*           7. MECHANISM UNIT ASSEMBLY <M7>           *
*****

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OR PQ42385B

#	REF NO.	PART NO.	PART NAME, DESCRIPTION
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*****
*      8. MECHANISM BASE ASSEMBLY <MB>      *
*****

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	111
	112
	113

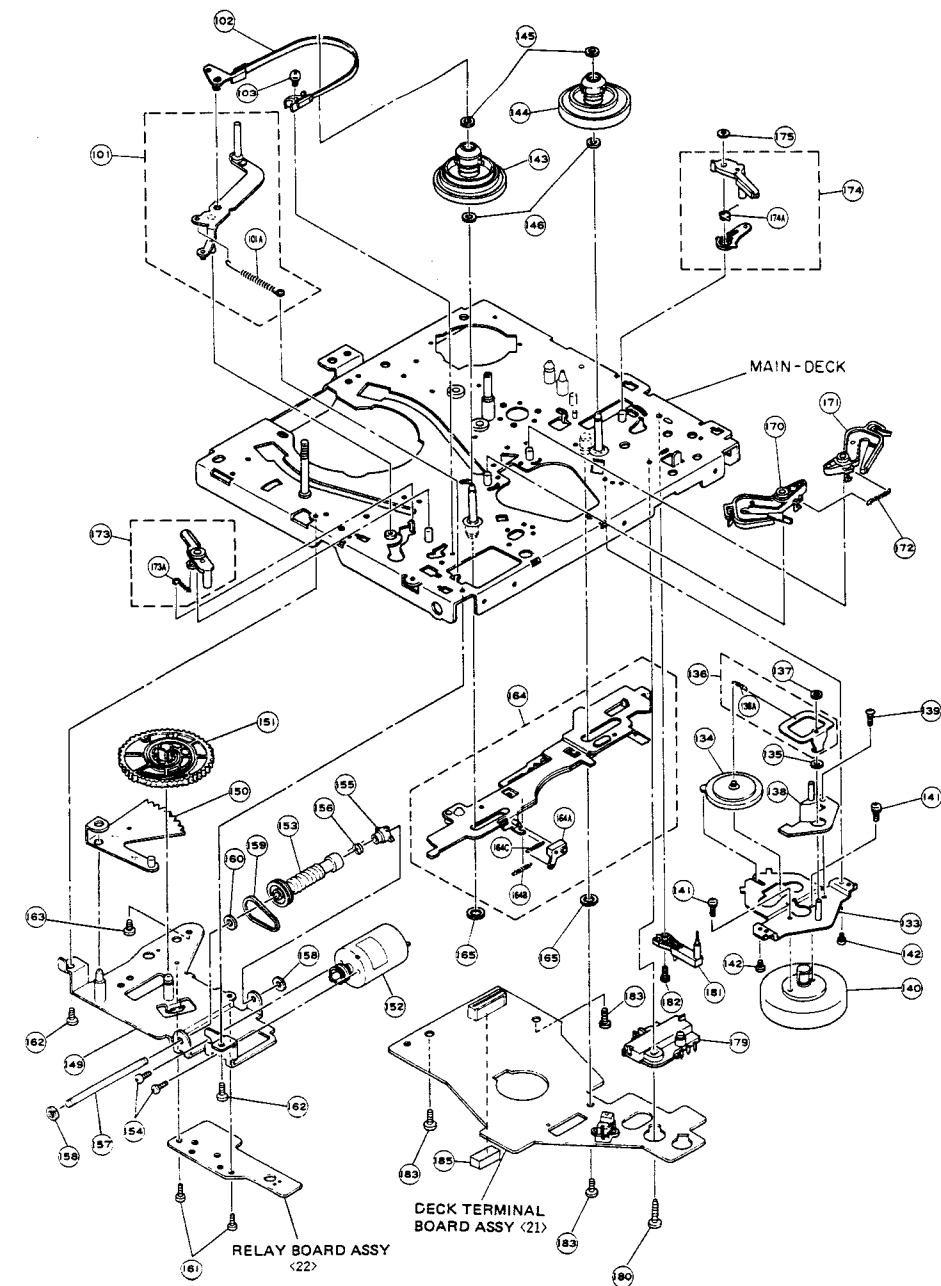
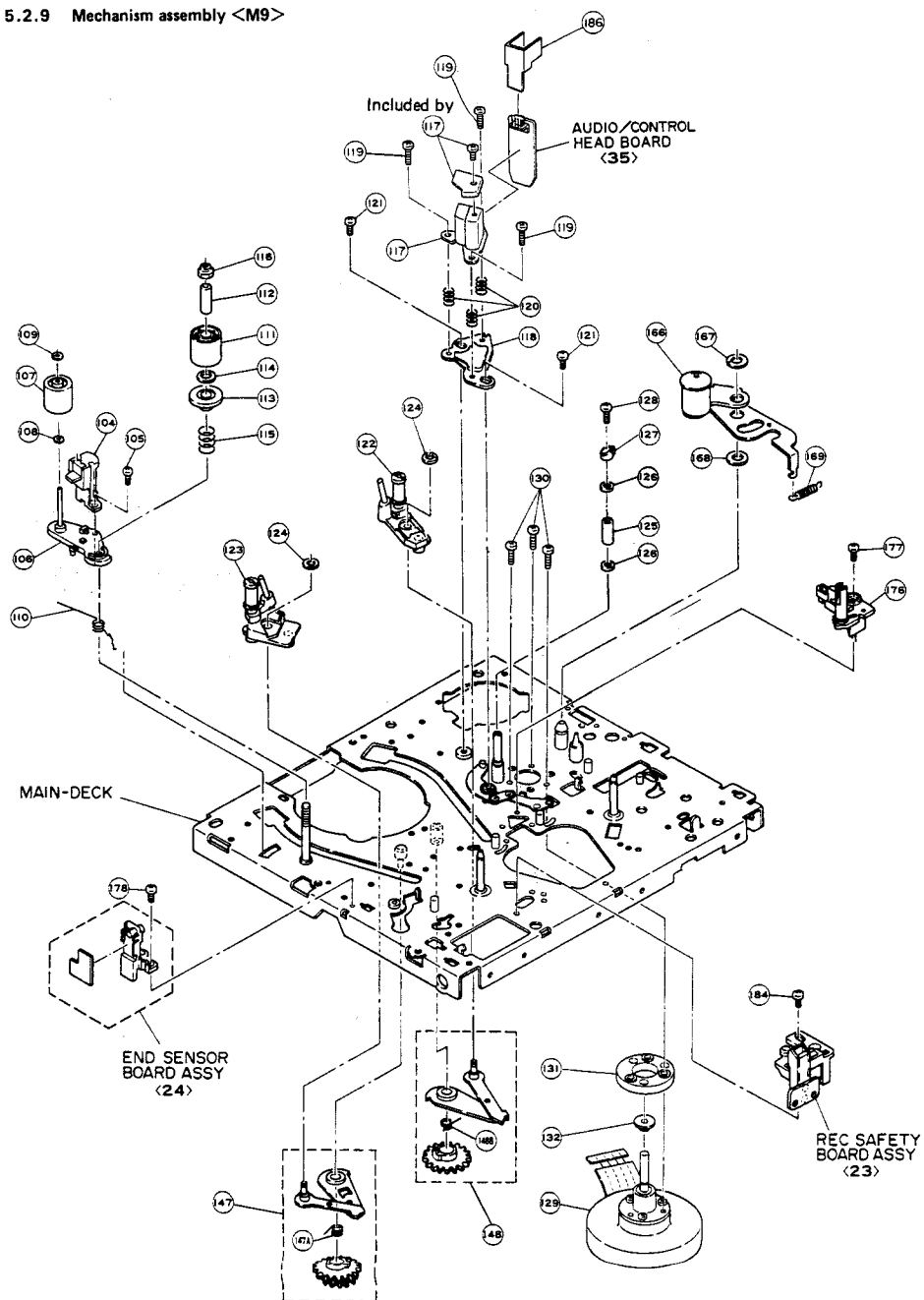
Diagram illustrating the exploded view of the Mechanism base assembly (ML-G00672A-03). The assembly includes the following components and sub-assemblies:

- NORMAL AUDIO BOARD ASSY (04)**
- MAIN DECK ASSY (M9)**
- REEL MDA BOARD ASSY (20)**
- SERVO & FM AUDIO PRE/REC BOARD ASSY (06)**
- Included by MECHA BASE WIRE ASSY (ML-G00672A-03)**

Key components and callouts shown in the diagram include:

- 101: Main Deck Assy (M9) base plate
- 102: Screws
- 103: Screws
- 104: Screws
- 105: Screws
- 106: Screws
- 107: Screws
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# 5.2.9 Mechanism assembly <M9>



Q	REF NO.	PART NO.	PART NAME, DESCRIPTION
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[illegible]

### SAFETY PRECAUTION

Parts identified by the  symbol are critical for safety. Replace only with specified part numbers.

ABBREVIATIONS IN THIS LIST ARE AS FOLLOWS:

**RESISTORS**— All resistance values are in ohms ( $\Omega$ ), unless otherwise indicated.

k	: 1,000 (Kilo)
M	: 1,000,000 (Mega)
Chip R	: Chip Resistor
Chip VR	: Chip Variable Resistor
Comp. R	: Composition Resistor
CR	: Carbon Film Resistor
FR	: Fusible Resistor
MFR	: Metal Film Resistor
MPR	: Metal Plate Resistor
OMR	: Oxide Metal Film Resistor
PMR	: Precision Metal Film Resistor
UFR	: Unflammable Resistor
VR	: Variable Resistor (Potentiometer)
WR	: Wire Wound Resistor

**CAPACITORS**—All capacitance values are in  $\mu\text{F}$ , unless otherwise indicated.

pF	: $\mu\text{F}$ (Pico farad)
C Cap	: Ceramic Capacitor
Chip Cap	: Chip Capacitor
Chip T Cap	: Chip Tantalum Capacitor
E Cap	: Electrolytic Capacitor
FM Cap	: Film Mica Capacitor
LL Cap	: Low Leak Current Electrolytic Capacitor
MM Cap	: Metalized Mylar Capacitor
MP Cap	: Metalized Paper Capacitor
MY Cap	: Mylar Capacitor
NP Cap	: Non-polar Capacitor
PC Cap	: Polycarbonate Capacitor
PP Cap	: Polypropylene Capacitor
PS Cap	: Polystyrol Capacitor
T Cap	: Tantalum Capacitor
TF Cap	: Thin Film Capacitor
TR Cap	: Trimmer Capacitor

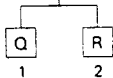




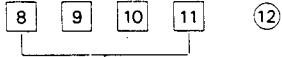
**NOTES:**

- [2 digits] indicates circuit board symbol number.
- "X " indicates quantity per set.

## 6.1 STANDARD PART NUMBER CODING

### 6.1.1 Fixed resistor coding

Fixed resistor part numbers are as follows.

Fixed resistors symbol		Rated wattage		Tolerance (in capital letters)		Assistant code (in capital letters)	
							
Type of resistor (in capital letters)		Shape of resistor (in figures)		Values			
Type of resistor (third digit)		Rated wattage (fourth and fifth digits)		Tolerance (seventh digit)		Assistant code (twelfth digit)	
C	Composition resistors	A0	1/10 W	F	± 1 %	A	Small type
D	Carbon film resistors	18	1/8 W	G	± 2 %	B	Small type
F	Unflammable resistors	16	1/6 W	J	± 5 %	S	Small type
G	Oxide metal film resistors	14	1/4 W	K	± 10 %	Y	Lead tapping
H	Fusible resistors	12	1/2 W	M	± 20 %	Z	Lead tapping
M	Metal plate resistors	01	1 W				
S	Metal glazed resistors	02	2 W				
V	Precision metal film resistors	03	3 W				
W	Wire wound resistors	04	4 W				
X	Metal film resistors	05	5 W				
Z	Special resistors	06	6 W				
		07	7 W				
		75	7.5 W				
		08	8 W				
		10	10 W				
		15	15 W				
		A6	16 W				
		20	20 W				
		30	30 W				

Values (eighth – tenth or eleventh digits)	
examples:	
R47 .....	0.47 Ω
4R7 .....	4.7 Ω
470 .....	47 × 10 <sup>0</sup> Ω
471 .....	47 × 10 <sup>1</sup> Ω
472 .....	47 × 10 <sup>2</sup> Ω
473 .....	47 × 10 <sup>3</sup> Ω
474 .....	47 × 10 <sup>4</sup> Ω
475 .....	47 × 10 <sup>5</sup> Ω
QVR resistance shown by four digits:	
4640 .....	464 × 10 <sup>0</sup> Ω
4641 .....	464 × 10 <sup>1</sup> Ω
4642 .....	464 × 10 <sup>2</sup> Ω



# Paper film capacitors

Type of capacitor (first - third digits)		Shape of capacitor (fourth digit)					
Symbol	Characteristics	Tubular	Normal		Flame retardant		
			Mono-direction	Kink lead	Mono-direction	Kink lead	
QFA	Metalized polypropylene					7	
QFE	Metalized mylar					5	
QFF	Film mica		4				
QFG	Polypropylene film		4	8			
QFH	Metalized mylar	2	4	3	5, 7		6
QFJ	Mylar (special)		4				
QFK	Metalized mylar (small)					5	
QFM	Mylar	2	4	3, 7	5		6
QFN	Mylar (small)		4	3			
QFP	Polypropylene		4	3, 8			
QFS	Polystyrene	2	4	3			
QFV	Thin film		4	8			
QFZ	Special type						Special coding

## Rated voltage (fifth and sixth digits)

Fifth digit \ Sixth digit	A	B	C	D	E	F	G	H	J	K	V	W	X
0						3.15	4.0		6.3				
1	10		16	20	25		40	50	63	80	35		
2	100	125	160	200	250	315	400	500	630		350	450	600
3	1000	1250		2000				5000					

## Tolerance (seventh digit)

A	+100 %	M	±20 %
F	±1 %	N	±30 %
G	±2 %	P	+100 %
H	+50 %	R	+30 %
J	±5 %	X	+40 %
K	±10 %	Z	+80 %
			-20 %

## Values (eighth - tenth digits)

Example: Values are in picofarads

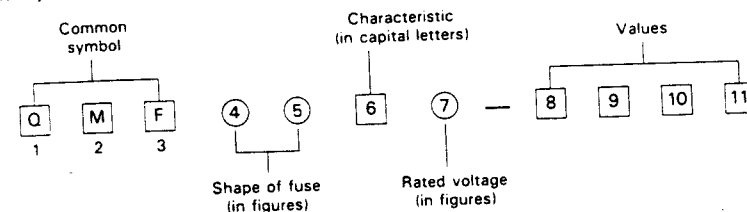
101	..... $10 \times 10^1$ pF	100 pF
102	..... $10 \times 10^2$ pF	1,000 pF (0.001 $\mu$ F)
103	..... $10 \times 10^3$ pF	10,000 pF (0.01 $\mu$ F)
104	..... $10 \times 10^4$ pF	100,000 pF (0.1 $\mu$ F)
105	..... $10 \times 10^5$ pF	1 $\mu$ F
5R0	.....	5.0 pF

## Assistant code (eleventh digit)

G Small size  
Z Lead taping  
Y Lead taping

# 6.1.3 Fuse coding

Standard fuse part numbers are as follows.



## Shape of fuse (fourth and fifth digits)

51	$\phi 5.2 \times 20$ mm
60	$\phi 6.4 \times 30$ mm
61	$\phi 6.35 \times 31.8$ mm
63	$\phi 6.4 \times 30$ mm with lead wires
66	$\phi 6.35 \times 31.8$ mm with lead wires
00	Special type

## Rated voltage (seventh digit)

1	AC125 V
2	AC250 V
3	0.1 - 1 A : AC250 V 1.25 - 6.3 A : AC125 V

## Values

(eighth-tenth or eleventh digits)  
example:

R63	.....	0.63 A
1R0	.....	1.0 A
2R5	.....	2.5 A
100	.....	10 A
R315	.....	0.315 A
1R25	.....	1.25 A

## Characteristics (sixth digit)

Symbol	Fusing Current	Fusing Time	Remarks
A	210 %	Within 2 min.	Anti-rush type (for Europe)
	275 %	0.6 - 10 sec.	
	400 %	0.15 - 3 sec.	
	1000 %	0.02 - 0.3 sec.	
B	210 %	Within 30 min.	Regular fusible type (for SEMKO, Europe)
	275 %	0.05 - 2 sec.	
	400 %	0.01 - 0.3 sec.	
C	135 %	Within 1 hr.	Regular fusible type (for UL, Japan)
	200 %	Within 2 min.	
E	210 %	Within 2 min.	Anti-rush type (for Europe)
	275 %	0.6 - 10 sec.	
	400 %	0.15 - 3 sec.	
	1000 %	0.02 - 0.3 sec.	
J	135 %	Within 1 hr.	Anti-rush type
	200 %	Within 2 min.	
M	135 %	Within 1 hr.	Regular fusible type (for UL)
	200 %	Within 2 min.	
R	160 %	Within 1 hr.	Regular fusible type
	200 %	Within 2 min.	
S	160 %	Within 1 hr.	Anti-rush type
	200 %	Within 2 min.	
	700 % - 2000 %	Within 0.01 sec.	
U	135 %	Within 1 hr.	Anti-rush type (for UL)
	200 %	Within 2 min.	
	800 % - 2000 %	Within 0.01 sec.	

Q. REF NO.	PART NO.	PART NAME, DESCRIPTION
10. AUDIO BOARD ASSEMBLY <01>		
PWB#	PGE10108B-01	AUDIO BOARD ASSY
IC20	TK15021	IC
IC21	M5218P	IC
IC22	M5218P	IC
IC23	TK15021	IC
IC24	TK15021	IC
IC25	M5218P	IC
IC26	M5218P	IC
IC27	TK15021	IC
IC28	NE650N	IC
IC29	NE650N	IC
IC30	AN3930K	IC
IC31	AN6299NK	IC
Q21	2SD638R, S	TRANSISTOR
Q29	2SC2647C	TRANSISTOR
Q30	2SC2647C	TRANSISTOR
Q31	2SC2647C	TRANSISTOR
Q32	2SC2647C	TRANSISTOR
Q33	2SC2647C	TRANSISTOR
Q34	2SC2647C	TRANSISTOR
Q35	DTA114YF	TRANSISTOR
Q36	DTA114YF	TRANSISTOR
D11	RD5.6EB2	ZENER DIODE
D12	RD5.1EB2	ZENER DIODE
D18	1SS133	DIODE
D19	1SS133	DIODE
D20	1SS133	DIODE
D21	1SS133	DIODE
D22	RD2.0EB	ZENER DIODE
D23	DA90	DIODE
D24	DA90	DIODE
D25	1SS133	DIODE
D26	1SS133	DIODE
R201	QRD161J-124	RESISTOR
R202	QRD161J-124	RESISTOR
R203	QRD161J-124	RESISTOR
R204	QRD161J-124	RESISTOR
R207	QRD161J-822	RESISTOR
R208	QRD161J-822	RESISTOR
R209	QVZ5514-472	V RESISTOR
R210	QVZ5514-472	V RESISTOR
R211	QRD161J-181	RESISTOR
R212	QRD161J-181	RESISTOR
R213	QRD161J-124	RESISTOR
R214	QRD161J-124	RESISTOR
R215	QRD161J-333	RESISTOR
R216	QRD161J-153	RESISTOR
R218	QRD161J-271	RESISTOR
R219	QRD161J-271	RESISTOR
R220	QRD161J-124	RESISTOR
R221	QRD161J-124	RESISTOR
R222	QRD161J-124	RESISTOR
R223	QRD161J-124	RESISTOR
R224	QRD161J-122	RESISTOR
R225	QRD161J-124	RESISTOR
R226	QRD161J-124	RESISTOR

Q.D.	REF NO.	PART NO.	PART NAME, DESCRIPTION
	R227	QRD161J-153	RESISTOR
	R228	QRD161J-333	RESISTOR
	R229	QRD161J-561	RESISTOR
	R230	QVZ3514-682	V RESISTOR
	R231	QRD161J-103	RESISTOR
	R232	QRD161J-103	RESISTOR
	R233	QRD161J-562	RESISTOR
	R234	QRD161J-562	RESISTOR
	R235	QRV143F-3301	CHF RESISTOR
	R236	QRV143F-3301	CHF RESISTOR
	R237	QRD161J-181	RESISTOR
	R238	QRD161J-181	RESISTOR
	R239	QRD161J-473	RESISTOR
	R240	QRD161J-473	RESISTOR
	R241	QRD161J-104	RESISTOR
	R242	QRD161J-104	RESISTOR
	R243	QRD161J-154	RESISTOR
	R244	QRD161J-154	RESISTOR
	R245	QRD161J-102	RESISTOR
	R246	QRD161J-102	RESISTOR
	R247	QRD161J-102	RESISTOR
	R248	QRD161J-102	RESISTOR
	R249	QRD161J-274	RESISTOR
	R250	QRD161J-274	RESISTOR
Δ	R251	QRZ0054-150	FUSIBL RESISTOR
Δ	R252	QRZ0054-150	FUSIBL RESISTOR
	R253	QRD161J-181	RESISTOR
	R254	QRD161J-181	RESISTOR
	R255	QRD161J-124	RESISTOR
	R256	QRD161J-124	RESISTOR
	R257	QRD161J-124	RESISTOR
	R258	QRD161J-124	RESISTOR
	R259	QRD161J-102	RESISTOR
	R260	QRD161J-102	RESISTOR
	R261	QRD161J-562	RESISTOR
	R262	QRD161J-562	RESISTOR
	R263	QRD161J-102	RESISTOR
	R264	QRD161J-102	RESISTOR
	R265	QRD161J-102	RESISTOR
	R266	QRD161J-102	RESISTOR
	R267	QRD161J-102	RESISTOR
	R268	QRD161J-102	RESISTOR
	R269	QRD161J-122	RESISTOR
	R270	QRD161J-122	RESISTOR
	R271	QRD161J-122	RESISTOR
	R272	QRD161J-122	RESISTOR
Δ	R273	QRD161J-220	RESISTOR
	R301	QVZ3514-332	V RESISTOR
	R302	QVZ3514-332	V RESISTOR
	R303	QVZ3513-472	V RESISTOR
	R304	QVZ3513-472	V RESISTOR
	R305	QRD161J-562	RESISTOR
	R306	QRD161J-562	RESISTOR
	R307	QRD161J-224	RESISTOR
	R308	QRD161J-224	RESISTOR
	R309	QRD161J-123	RESISTOR
	R310	QRD161J-622	RESISTOR
	R311	QRD161J-104	RESISTOR
	R312	QRD161J-104	RESISTOR
	R313	QRD161J-104	RESISTOR
	R314	QRD161J-104	RESISTOR
	R315	QRD161J-102	RESISTOR
	R316	QRD161J-102	RESISTOR
	R317	QRD161J-104	RESISTOR
	R318	QRD161J-104	RESISTOR
	R319	QRD161J-104	RESISTOR
	R320	QRD161J-104	RESISTOR

REF NO.	PART NO.	PART NAME, DESCRIPTION
R321	QRD161J-102	RESISTOR
R322	QRD161J-102	RESISTOR
R323	QRD161J-104	RESISTOR
R324	QRD161J-104	RESISTOR
R325	QRD161J-104	RESISTOR
R326	QRD161J-104	RESISTOR
R327	QRD161J-102	RESISTOR
R328	QRD161J-102	RESISTOR
R329	QRD161J-103	RESISTOR
R330	QRD161J-102	RESISTOR
R331	QRD161J-562	RESISTOR
R332	QRD161J-472	RESISTOR
R333	QRD161J-333	RESISTOR
R334	QRD161J-563	RESISTOR
R335	QRD161J-332	RESISTOR
R336	QRD161J-332	RESISTOR
R337	QRD161J-123	RESISTOR
R338	QRD161J-123	RESISTOR
R339	QRD161J-222	RESISTOR
R340	QRD161J-222	RESISTOR
R341	QRD161J-102	RESISTOR
R342	QRD161J-102	RESISTOR
R343	QRD161J-152	RESISTOR
R344	QRD161J-152	RESISTOR
R345	QRD161J-153	RESISTOR
R346	QRD161J-153	RESISTOR
R347	QRD161G-513	RESISTOR
R348	QRD161G-513	RESISTOR
R349	QRD161J-123	RESISTOR
R350	QRD161J-123	RESISTOR
R351	QRD161J-123	RESISTOR
R352	QRD161J-123	RESISTOR
R353	QRD161J-392	RESISTOR
R354	QRD161J-392	RESISTOR
R355	QRD161J-682	RESISTOR
R356	QRD161J-682	RESISTOR
R357	QRD161J-821	RESISTOR
R358	QRD161J-821	RESISTOR
R359	QRD161J-102	RESISTOR
R360	QRD161J-102	RESISTOR
R361	QRD161J-104	RESISTOR
R362	QVZ3513-472	V RESISTOR
R363	QVZ3513-472	V RESISTOR
R364	QRD161J-221	RESISTOR
R365	QRD161J-221	RESISTOR
R509	QRD161J-563	RESISTOR
R510	QRD161J-223	RESISTOR
C201	QETC1EM-475	E CAPACITOR
C202	QETC1EM-475	E CAPACITOR
C203	QETC1CM-476	E CAPACITOR
C205	QETC1CM-107	E CAPACITOR
C206	QETC1CM-476	NP E CAPACITOR
C207	QEN61EM-475	NP E CAPACITOR
C208	QEN61EM-475	NP E CAPACITOR
C209	QEN61EM-475	NP E CAPACITOR
C210	QEN61EM-475	NP E CAPACITOR
C211	QETC1EM-475	E CAPACITOR
C212	QETC1EM-475	E CAPACITOR
C213	QETC1CM-476	E CAPACITOR
C214	QETC1EM-475	E CAPACITOR
C215	QETC1EM-475	NP E CAPACITOR
C217	QEN61EM-475	NP E CAPACITOR
C218	QEN61EM-475	NP E CAPACITOR
C219	QEN61EM-475	NP E CAPACITOR
C220	QEN61EM-475	NP E CAPACITOR

REF NO.	PART NO.	PART NAME, DESCRIPTION
C221	QEN61EM-475	NP E CAPACITOR
C222	QEN61EM-475	NP E CAPACITOR
C223	QEN61EM-335	NP E CAPACITOR
C224	QEN61EM-335	NP E CAPACITOR
C225	QETC1CM-475	E CAPACITOR
C226	QETC1CM-476	E CAPACITOR
C227	QEN61EM-475	NP E CAPACITOR
C228	QETC1CM-226	E CAPACITOR
C229	QETC1CM-476	E CAPACITOR
C230	QETC1EM-475	E CAPACITOR
C231	QETC1CM-476	E CAPACITOR
C232	QETC1EM-335	E CAPACITOR
C233	QETC1EM-335	E CAPACITOR
C234	QETC1EM-475	E CAPACITOR
C235	QETC1EM-335	E CAPACITOR
C236	QETC1EM-335	E CAPACITOR
C237	QFN31HJ-222	M CAPACITOR
C238	QFP31HJ-222	PP CAPACITOR
C239	QFP42AF-472M	PP CAPACITOR
	OR QFP31HF-472	PP CAPACITOR
C240	QFP42AF-472M	PP CAPACITOR
	OR QFP31HF-472	PP CAPACITOR
C241	QETC1CM-226	E CAPACITOR
C242	QETC1CM-226	E CAPACITOR
C243	QFP42AF-273M	PP CAPACITOR
	OR QFP41HF-273	PP CAPACITOR
C244	QFP42AF-273M	PP CAPACITOR
	OR QFP41HF-273	PP CAPACITOR
C245	QETC1CM-227	E CAPACITOR
C246	QETC1CM-227	E CAPACITOR
C247	QETC1CM-227	E CAPACITOR
C248	QETC1CM-227	E CAPACITOR
C249	QEB61HM-334	LL CAPACITOR
C250	QEB61HM-334	LL CAPACITOR
C251	QEB61HM-104	E CAPACITOR
C252	QEB61HM-104	E CAPACITOR
C253	QETC1CM-106	E CAPACITOR
C254	QETC1CM-106	E CAPACITOR
C255	QFN31HJ-473	M CAPACITOR
C256	QFN31HJ-473	M CAPACITOR
C257	QEN61EM-475	NP E CAPACITOR
C258	QEN61EM-475	NP E CAPACITOR
C259	QETC1CM-226	E CAPACITOR
C260	QETC1CM-226	E CAPACITOR
C261	QFP42AF-562M	PP CAPACITOR
	OR QFP31HF-562	PP CAPACITOR
C262	QFP42AF-562M	PP CAPACITOR
	OR QFP31HF-562	PP CAPACITOR
C263	QETC1CM-476	E CAPACITOR
C264	QETC1CM-476	E CAPACITOR
C266	QEN61EM-475	NP E CAPACITOR
C267	QETC1CM-226	E CAPACITOR
C301	QETC1AM-336	E CAPACITOR
C302	QETC1AM-336	E CAPACITOR
C303	QFN31HK-103	M CAPACITOR
C304	QFN31HK-103	M CAPACITOR
C305	QCT05CH-101	CAPACITOR
C306	QCT05CH-101	CAPACITOR
C307	QETC1CM-476	E CAPACITOR
C308	QETC1EM-335	E CAPACITOR
C309	QETC1CM-476	E CAPACITOR
C310	QETC1CM-476	E CAPACITOR
C311	QCF31HP-223	CAPACITOR
C312	QCF31HP-223	CAPACITOR
C313	QCF31HP-103	CAPACITOR
C314	QCF31HP-103	CAPACITOR
C315	QCF31HP-103	CAPACITOR
C316	QCF31HP-103	CAPACITOR

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&lt;03&gt;&lt;04&gt;

REF NO.	PART NO.	PART NAME, DESCRIPTION
C38	QCF31HP-222	CAPACITOR
C39	QCS31HJ-101	CAPACITOR
C40	QCS31HJ-101	CAPACITOR
C41	QCS31HJ-560	CAPACITOR
C42	QETC1HM-104	E CAPACITOR
C43	QCF31HP-103	CAPACITOR
C44	QETC1CM-107	E CAPACITOR
C45	QCF31HP-223	CAPACITOR
C46	QCF31HP-223	CAPACITOR
C47	QCF31HP-223	CAPACITOR
C48	QCF31HP-103	CAPACITOR
C49	QETC1HM-224	E CAPACITOR
L1	PGZ00617-221	COIL
CF1	PU49487	RESONATOR
X1	PGZ00157-1-1	CRYSTAL RESONATOR
SW1	QSS1K81-L01	DIP SWITCH
RY1	PU56539	DC RELAY
BKT1	PGD30295-02-02	AUDIO PWB STAY
SCW1	GBST30062	TAPPING SCREW, X2
SKT1	PGZ00331-028	IC SOCKET
GND	PU54983	TEST PIN
CN1	PGZ00421-64	MALE CONNECTOR
CN2	PGZ00421-64	MALE CONNECTOR

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 \* 13. NORMAL AUDIO BOARD ASSEMBLY <04> \*  
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PWBA	PGE202388	NORMAL AUDIO BOARD ASSY
IC1	AN6394	IC
IC2	AN6394	IC
IC3	MS218P	IC
Q1	2SD661T,U	TRANSISTOR
Q2	2SD661T,U	TRANSISTOR
Q3	2SD958T,U	TRANSISTOR
Q4	2SD958T,U	TRANSISTOR
Q5	2SD958T,U	TRANSISTOR
Q6	2SD958T,U	TRANSISTOR
Q7	2SC2021LNE	TRANSISTOR
Q8	2SC2021LNE	TRANSISTOR
Q9	2SC2021LNE	TRANSISTOR
Q10	2SC2021LNE	TRANSISTOR
Q11	DTIC124EF	TRANSISTOR
Q12	DTIC124EF	TRANSISTOR
Q13	DTIC124EF	TRANSISTOR
Q14	DTIC124EF	TRANSISTOR
Q15	DTA124EF	TRANSISTOR
Q16	DTA124EF	TRANSISTOR
Q17	2SB788S,T,U	TRANSISTOR
Q18	2SB788S,T,U	TRANSISTOR
Q19	2SC2878A,B	TRANSISTOR
Q20	DTA124EF	TRANSISTOR
Q21	DTIC124EF	TRANSISTOR
Q22	DTA124EF	TRANSISTOR
Q23	DTA124EF	TRANSISTOR

REF NO.	PART NO.	PART NAME, DESCRIPTION
Q24	2SD973AR	TRANSISTOR
Q25	DTIC124EF	TRANSISTOR
Q26	DTA124EF	TRANSISTOR
Q27	DTIC124EF	TRANSISTOR
Q28	2SB788S,T,U	TRANSISTOR
Q29	2SD958T,U	TRANSISTOR
Q30	2SD958T,U	TRANSISTOR
D1	1SS133	DIODE
D2	OR MA165	DIODE
D3	1SS133	DIODE
D4	OR MA165	DIODE
D5	1SS133	DIODE
D6	OR MA165	DIODE
D7	1SS133	DIODE
D8	OR MA165	DIODE
D9	1SS133	DIODE
D10	OR MA165	DIODE
D11	RD6.2E83	ZENER DIODE
D12	1SS133	DIODE
D13	OR MA165	DIODE

R1	QVZ3514-152	V RESISTOR,L-CH PB EQ
R2	QVZ3514-152	V RESISTOR,R-CH PB EQ
R3	QVZ3514-103	V RESISTOR,L-CH PB LEV
R4	QVZ3514-103	V RESISTOR,R-CH PB LEV
R5	QVZ3513-222	V RESISTOR,L-CH REC LEV
R6	QVZ3513-222	V RESISTOR,R-CH REC LEV
R7	QVZ3513-101	V R,L-CH VHS REC LEV
R8	QVZ3513-101	V R,R-CH VHS REC LEV
R9	QVZ3513-221	V R,L-CH S-VHS REC LEV
R10	QVZ3513-221	V R,R-CH S-VHS REC LEV
R11	QVZ3513-473	V RESISTOR,L-CH BIAS
R12	QVZ3513-473	V RESISTOR,R-CH BIAS
R13	QRD161J-0R0	RESISTOR
R14	QRD161J-0R0	RESISTOR
R15	QRD161J-183	RESISTOR
R16	QRD161J-183	RESISTOR
R17	QRD161J-153	RESISTOR
R18	QRD161J-153	RESISTOR
R19	QRD161J-122	RESISTOR
R20	QRD161J-122	RESISTOR
R21	QRD161J-472	RESISTOR
R22	QRD161J-472	RESISTOR
R23	QRD161J-472	RESISTOR
R24	QRD161J-474	RESISTOR
R25	QRD161J-473	RESISTOR
R26	QRD161J-473	RESISTOR
R27	QRD161J-393	RESISTOR
R28	QRD161J-393	RESISTOR
R29	QRD161J-222	RESISTOR
R30	QRD161J-222	RESISTOR
R31	QRD161J-221	RESISTOR
R32	QRD161J-221	RESISTOR
R33	QRD161J-473	RESISTOR
R34	QRD161J-473	RESISTOR
R35	QRD161J-393	RESISTOR
R36	QRD161J-393	RESISTOR

REF NO.	PART NO.	PART NAME, DESCRIPTION
R37	QRD161J-222	RESISTOR
R38	QRD161J-222	RESISTOR
R39	QRD161J-221	RESISTOR
R40	QRD161J-221	RESISTOR
R41	QRD161J-183	RESISTOR
R42	QRD161J-183	RESISTOR
R43	QRG129J-471	RESISTOR
R44	QRG129J-471	RESISTOR
R45	QRD161J-561	RESISTOR
R46	QRD161J-561	RESISTOR
R47	QRD161J-393	RESISTOR
R48	QRD161J-393	RESISTOR
R49	QRD161J-102	RESISTOR
R50	QRD161J-102	RESISTOR
R51	QRD161J-332	RESISTOR
R52	QRD161J-332	RESISTOR
R53	QRD161J-103	RESISTOR
R54	QRD161J-103	RESISTOR
R55	QRD161J-332	RESISTOR
R56	QRD161J-332	RESISTOR
R57	QRD161J-223	RESISTOR
R58	QRD161J-223	RESISTOR
R59	QRD161J-103	RESISTOR
R60	QRD161J-103	RESISTOR
R61	QRG129J-470	RESISTOR
R62	QRG129J-470	RESISTOR
R63	QVZ3513-103	V RESISTOR,L-CH EE LEV
R64	QVZ3513-103	V RESISTOR,R-CH EE LEV
R65	QRD161J-223	RESISTOR
R66	QRD161J-223	RESISTOR
R67	QRD161J-822	RESISTOR
R68	QRD161J-822	RESISTOR
R69	QRD161J-822	RESISTOR
R70	QRD161J-822	RESISTOR
R71	QRD161J-272	RESISTOR
R72	QRD161J-272	RESISTOR
R73	QRD161J-682	RESISTOR
R74	QRD161J-682	RESISTOR
R75	QRD161J-272	RESISTOR
R76	QRD161J-272	RESISTOR
R77	QRD161J-153	RESISTOR
R78	QRD161J-153	RESISTOR
R79	QRD161J-103	RESISTOR
R80	QRD161J-103	RESISTOR
R81	QRD161J-821	RESISTOR
R82	QRD161J-821	RESISTOR
R83	QRD161J-822	RESISTOR
R84	QRD161J-822	RESISTOR
R85	QRD161J-823	RESISTOR
R86	QRD161J-682	RESISTOR
R87	QRD161J-183	RESISTOR
R88	QRD161J-223	RESISTOR
R89	QRD161J-103	RESISTOR
R90	QRD161J-563	RESISTOR
R91	QRD161J-822	RESISTOR
R92	QRD161J-821	RESISTOR
R93	QRD161J-332	RESISTOR
R94	QRD161J-183	RESISTOR
R95	QRD161J-472	RESISTOR
R96	QRD161J-122	RESISTOR
R97	QRD161J-562	RESISTOR
R98	QRD161J-562	RESISTOR
R99	QRD161J-103	RESISTOR
R100	QRD161J-102	RESISTOR
R101	QRD161J-102	RESISTOR
R102	QRD161J-104	RESISTOR
R103	QRD161J-104	RESISTOR

&lt;04&gt;

REF NO.	PART NO.	PART NAME, DESCRIPTION
R104	QRD161J-104	RESISTOR
R105	QRD161J-104	RESISTOR
R106	QRD161J-104	RESISTOR
R107	QRD161J-104	RESISTOR
R108	QRD161J-103	RESISTOR
R109	QRD161J-103	RESISTOR
R110	QRD161J-562	RESISTOR
R111	QRD161J-562	RESISTOR
R112	QRD161J-222	RESISTOR
R113	QRD161J-222	RESISTOR
C1	QCS31HJ-391	CAPACITOR
C2	QCS31HJ-391	CAPACITOR
C3	QCS31HJ-561	CAPACITOR
C4	QCS31HJ-561	CAPACITOR
C5	QEB61CM-106	LL CAPACITOR
C6	QEB61CM-106	LL CAPACITOR
C7	QEB61EM-475	LL CAPACITOR
C8	QEB61EM-475	LL CAPACITOR
C9	QETC1CM-226	E CAPACITOR
C10	QETC1CM-226	E CAPACITOR
C11	QEB61EM-475	LL CAPACITOR
C12	QEB61EM-475	LL CAPACITOR
C13	QETC1CM-226	E CAPACITOR
C14	QETC1CM-226	E CAPACITOR
C15	QEU41CM-337	E CAPACITOR
C16	QEU41CM-337	E CAPACITOR
C17	QEB61CM-106	LL CAPACITOR
C18	QEB61CM-106	LL CAPACITOR
C19	QETC1CM-476	E CAPACITOR
C20	QETC1CM-476	E CAPACITOR
C21	QFV41HJ-823	TF CAPACITOR
C22	QFV41HJ-823	TF CAPACITOR
C23	QETC1CM-106	E CAPACITOR
C24	QETC1CM-106	E CAPACITOR
C25	QETC1CM-106	E CAPACITOR
C26	QETC1CM-106	E CAPACITOR
C29	QETC1HM-335	E CAPACITOR
C30	QETC1HM-335	E CAPACITOR
C31	QETC1EM-475	E CAPACITOR
C32	QETC1EM-475	E CAPACITOR
C33	QFV41HJ-333M	TF CAPACITOR
C34	QFV41HJ-333M	TF CAPACITOR
C35	QETC1CM-106	E CAPACITOR
C36	QETC1CM-106	E CAPACITOR
C37	QETC1CM-107	E CAPACITOR
C38	QETC1CM-107	E CAPACITOR
C39	QETC0JM-107	E CAPACITOR
C40	QETC0JM-107	E CAPACITOR
C41	QETC1CM-106	E CAPACITOR
C42	QETC1CM-106	E CAPACITOR
C43	QETC1CM-106	E CAPACITOR
C44	QETC1CM-106	E CAPACITOR
C45	QCS31HJ-101	CAPACITOR
C46	QCS31HJ-101	CAPACITOR
C47	QETC1HM-335	E CAPACITOR
C48	QETC1HM-335	E CAPACITOR
C49	QETC1HM-105	E CAPACITOR
C50	QETC1HM-105	E CAPACITOR
C51	QETC1HM-335	E CAPACITOR
C52	QETC1HM-335	E CAPACITOR
C53	QETC1HM-335	E CAPACITOR
C54	QETC1HM-335	E CAPACITOR
C55	QETC1HM-335	E CAPACITOR
C56	QETC1HM-335	E CAPACITOR
C57	QETC1HM-335	E CAPACITOR
C58	QETC1HM-335	E CAPACITOR
C59	QETC1CM-336	E CAPACITOR



# REF NO.	PART NO.	PART NAME, DESCRIPTION
C60	QETC1CM-336	E CAPACITOR
C61	QFN31HJ-122	M CAPACITOR
C62	QFN31HJ-122	M CAPACITOR
C63	QFL41HJ-182	M CAPACITOR
C64	QFL41HJ-182	M CAPACITOR
C65	QFV41HJ-684M	T.F CAP
C66	QFV41HJ-684M	T.F CAP
C67	QFV41HJ-153M	TF CAPACITOR
C68	QFV41HJ-153M	TF CAPACITOR
C69	QFV41HJ-123M	TF CAPACITOR
C70	QFV41HJ-123M	TF CAPACITOR
C71	QETC1EM-475	E CAPACITOR
C72	QETC1CM-226	E CAPACITOR
C73	QEU41CM-337	E CAPACITOR
C74	QEU41CM-107	E CAPACITOR
C75	QETC1HM-225	E CAPACITOR
C76	QCS11HJ-181	CAPACITOR
C77	QCS11HJ-181	CAPACITOR
C78	QETC1CM-226	E CAPACITOR
C79	QETC1CM-226	E CAPACITOR
C80	QFN31HJ-123	M CAPACITOR
C81	QFN31HJ-123	M CAPACITOR
C82	QFN31HJ-332	M CAPACITOR
C83	QFN31HJ-332	M CAPACITOR
C84	QETC1HM-225	E CAPACITOR
C85	QETC1HM-225	E CAPACITOR
C86	QETC1CM-476	E CAPACITOR
C87	QFV41HJ-333M	TF CAPACITOR
C88	QFV41HJ-333M	TF CAPACITOR
C89	QETC1EM-475	E CAPACITOR
C90	QETC1EM-475	E CAPACITOR
C91	QETC1HM-335	E CAPACITOR
C92	QETC1HM-335	E CAPACITOR
L1	PGZ00121-472	COIL
L2	PGZ00121-472	COIL
L3	PGZ00121-472	COIL
L4	PGZ00121-472	COIL
L5	PUS3607-152	COIL
L6	PUS3607-152	COIL
L7	PU48530-391J	COIL
L8	PU48530-391J	COIL
L9	PU30284-51R	COIL
XB1	PU47900-6	OSC BLOCK
CL1	PU59311-3	WIRE CLAMP
SCW1	GBST3006Z	TAPPING SCREW, X2
SLD1	PRS30014	SHIELD CASE
SLD2	PGD40329-02	INSULATOR
TP1	PU54983	TEST PIN, X20(TP1-19,22)
CN1	PUS8844-3R	CAP HOUSING
CN2	PUS8844-3Y	CAP HOUSING
CN3	PUS8844-4R	CAP HOUSING
CN4	PUS8844-4Y	CAP HOUSING
CN5	PUS8844-3R	CAP HOUSING
CN6	PUS8844-4	CAP HOUSING
CN7	PUS8844-3	CAP HOUSING
CN8	PUS8844-3	CAP HOUSING
CP1	ICP-F10	CIRCUIT PROTECTOR

# REF NO.	PART NO.	PART NAME, DESCRIPTION
***** 14. VIDEO PRE/REC BOARD ASSEMBLY <05> *****		
PWBA	PGE20236A-02	VIDEO PRE/REC BOARD ASSY
IC1	EHM-822A29	IC
IC2	AN6330	IC
IC3	VC2011	IC
Q1	2SC2021Q,R,S	TRANSISTOR
Q2	2SD638Q,R,S	TRANSISTOR
Q3	2SB793AR	TRANSISTOR
Q4	2SC941Y	TRANSISTOR
Q5	2SC941Y	TRANSISTOR
Q6	2SC2647C	TRANSISTOR
Q7	2SC2647C	TRANSISTOR
Q8	2SC2647C	TRANSISTOR
Q9	2SC2647C	TRANSISTOR
D1	1SS133	DIODE
D2	1SS133	DIODE
D3	1SS133	DIODE
R1	QVZ3513-222	V RESISTOR,REC FM LEVEL
R2	QVZ3513-222	V R,REC COLOR LEVEL
R3	QRD161J-391	RESISTOR
R4	QRD161J-222	RESISTOR
R5	QRD161J-102	RESISTOR
R6	QRD161J-102	RESISTOR
R7	QRD161J-103	RESISTOR
R8	QRD161J-223	RESISTOR
R9	QRD161J-682	RESISTOR
R10	QRD161J-822	RESISTOR
R11	QRD161J-3R9	RESISTOR
R12	QRD161J-3R9	RESISTOR
R13	QRD167J-470	RESISTOR
R14	QVZ3513-101	V RESISTOR,REC COLOR BAL
R15	QRD161J-273	RESISTOR
R16	QVZ3514-102	V RESISTOR,CH-1 Q
R17	QRD161J-471	RESISTOR
R18	QRD161J-822	RESISTOR
R19	QRD161J-223	RESISTOR
R20	QRD161J-271	RESISTOR
R21	QRD161J-682	RESISTOR
R22	QVZ3514-222	V RESISTOR,COLOR BAL
R23	QRD161J-822	RESISTOR
R24	QRD161J-822	RESISTOR
R25	QRD161J-223	RESISTOR
R26	QRD161J-471	RESISTOR
R27	QVZ3514-102	V RESISTOR,CH-2 Q
R28	QRD161J-273	RESISTOR
R29	QRD161J-681	RESISTOR
R30	QRD161J-333	RESISTOR
R31	QRD161J-153	RESISTOR
R32	QRD161J-222	RESISTOR
R33	QRD161J-101	RESISTOR
R34	QRD161J-102	RESISTOR
R36	QRD161J-102	RESISTOR
R37	QVZ3514-102	V RESISTOR,PB COLOR
R38	QRD161J-221	RESISTOR
R39	QRD161J-473	RESISTOR
R40	QRD161J-472	RESISTOR
R41	QRD161J-182	RESISTOR
R42	QRD161J-103	RESISTOR
R43	QRD161J-332	RESISTOR
R44	QRD161J-182	RESISTOR

# REF NO.	PART NO.	PART NAME, DESCRIPTION
R45	QRD161J-103	RESISTOR
R46	QRD161J-332	RESISTOR
R47	QRD161J-103	RESISTOR
C2	QFN31HK-333	M CAPACITOR
C3	QCS31HJ-120	CAPACITOR
C4	QCF31HP-223	E CAPACITOR
C5	QETC1CM-107	E CAPACITOR
C6	QFN31HK-473	M CAPACITOR
C7	QFN31HK-473	M CAPACITOR
C8	QEE41CM-106	TANTAL CAPACITOR
C9	QAT3001-028	TRIMMER CAPACITOR,CH-1F
C10	QAT3001-028	TRIMMER CAPACITOR,CH-2F
C11	QFN31HK-223	M CAPACITOR
C12	QETC1CM-336	E CAPACITOR
C13	QCF31HP-223	CAPACITOR
C14	QCS31HJ-560	CAPACITOR
C15	QFN31HK-223	M CAPACITOR
C16	QETC1HM-105	E CAPACITOR
C17	QFN31HK-223	M CAPACITOR
C18	QFN31HK-223	M CAPACITOR
C19	QCS31HJ-560	CAPACITOR
C20	QFN31HK-223	M CAPACITOR
C21	QFN31HK-223	M CAPACITOR
C22	QETC1HM-105	E CAPACITOR
C23	QCF31HP-223	CAPACITOR
C24	QETC1CM-336	E CAPACITOR
C25	QETC1CM-336	E CAPACITOR
C26	QCF31HP-223	CAPACITOR
C27	QFN31HJ-562	M CAPACITOR
C28	QETC1HM-105	E CAPACITOR
C29	QETC1CM-336	E CAPACITOR
C30	QCF31HP-223	CAPACITOR
C31	QFN31HK-102	M CAPACITOR
C32	QCS31HJ-331	CAPACITOR
C33	QFN31HK-223	M CAPACITOR
C34	QFN31HK-223	M CAPACITOR
C35	QFN31HK-223	M CAPACITOR
C36	QFN31HK-102	M CAPACITOR
L1	PU48530-470J	COIL
L2	PU48530-101K	COIL
L3	PU48530-150J	COIL
L4	PU48530-150J	COIL
L5	PU48530-101K	COIL
L6	PU48530-101K	COIL
L7	PU48530-821J	COIL
LPF1	PU50747	LOW PASS FILTER
RY1	PU55260	RELAY
BKT1	PQ42326	PWB BKT
SCW1	OPSP2608Z	SCREW, X2
TP1	PU54983	TEST PIN, X8(TP1-8)
CN1	PU56258-10	CAP HOUSING
CN2	PU58844-8	CAP HOUSING
CN3	PU58844-4	CAP HOUSING
CP1	ICP-F10	CIRCUIT PROTECTOR

# REF NO.	PART NO.	PART NAME, DESCRIPTION
***** 15. SERVO & FMA PRE/REC BOARD ASSEMBLY <06> *****		
PWBA	PGE202468-01	S&F PRE/REC BOARD ASSY
IC1	HD49722NT	IC
IC2	UPC393C	IC
IC3	M54647L	IC
IC4	B46259N	IC
IC7	TC40218P	IC
IC8	UPD6345C	IC
IC9	UPD6345C	IC
IC101	HA11752	IC
Q1	DTC144EF	TRANSISTOR
Q2	DTC144EF	TRANSISTOR
Q3	2SB793AR	TRANSISTOR
OR	2SB793R	TRANSISTOR
Q4	DTC144EF	TRANSISTOR
Q101	2SC2021R,S	TRANSISTOR
Q102	2SC2021R,S	TRANSISTOR
Q103	2SC2647C	TRANSISTOR
Q104	2SC2647C	TRANSISTOR
Q105	2SC2021R,S	TRANSISTOR
Q106	2SC2647C	TRANSISTOR
Q107	2SC2647C	TRANSISTOR
Q108	2SB643Q,R,S	TRANSISTOR
Q109	2SD638Q,R,S	TRANSISTOR
Q110	2SC2647C	TRANSISTOR
Q111	2SC2647C	TRANSISTOR
Q112	2SC2647C	TRANSISTOR
Q113	2SB793R	TRANSISTOR
Q114	2SB793R	TRANSISTOR
D1	1SS133	DIODE
D2	1SS133	DIODE
D3	1SS133	DIODE
D4	1SS133	DIODE
D5	1SS136	DIODE
D6	1SS133	DIODE
D101	1SS133	DIODE
D102	1SS133	DIODE
R1	QRD161J-222	RESISTOR
R2	QRD161J-153	RESISTOR
R3	QRD161J-105	RESISTOR
R4	QRD161J-103	RESISTOR
R5	QRD161J-273	RESISTOR
R6	QRD161J-105	RESISTOR
R7	QRD161J-105	RESISTOR
R8	QRD161J-683	RESISTOR
R9	QRD161J-105	RESISTOR
R10	QRD161J-394	RESISTOR
R11	QRD161J-222	RESISTOR
R12	QRD161J-104	RESISTOR
R13	QRD161J-105	RESISTOR
R14	QRD161J-273	RESISTOR
R15	QRD161J-224	RESISTOR
R16	QRD161J-223	RESISTOR
R17	QVZ3513-334	V R,PB SWITCH POINT
R18	PGZ01102	V RESISTOR,TRACKING
R19	QRD161J-682	RESISTOR
R20	QRD161J-331	RESISTOR
R21	QVZ3513-224	V RESISTOR,SUB TK

REF NO.	PART NO.	PART NAME, DESCRIPTION
R22	QRD161J-105	RESISTOR
R23	QRD161J-102	RESISTOR
R24	QRD161J-474	RESISTOR
R25	QRD161J-103	RESISTOR
R26	QRD161J-562	RESISTOR
R28	QRD161J-333	RESISTOR
R31	QRD161J-103	RESISTOR
R32	QRD161J-103	RESISTOR
R33	QRD161J-104	RESISTOR
R34	QRD161J-102	RESISTOR
R35	QRD161J-102	RESISTOR
R36	QRD161J-271	RESISTOR
R37	QV23513-681	V RESISTOR, TU REEL
R38	QRD161J-102	RESISTOR
R39	QRD161J-102	RESISTOR
R41	QRD161J-102	RESISTOR
R42	QRD161J-102	RESISTOR
R43	QRD161J-333	RESISTOR
R44	QRD161J-222	RESISTOR
R45	QRD161J-103	RESISTOR
R46	QRD161J-103	RESISTOR
R47	QRD161J-103	RESISTOR
R48	QRD161J-103	RESISTOR
R49	QRD161J-333	RESISTOR
R50	QRD161J-124	RESISTOR
R51	QRD161J-124	RESISTOR
R52	QRD161J-104	RESISTOR
R53	QRD161J-823	RESISTOR
R54	QRD161J-102	RESISTOR
R55	QRD161J-102	RESISTOR
R56	QRD161J-102	RESISTOR
R57	QRD161J-102	RESISTOR
R58	QRD161J-102	RESISTOR
R59	QRD161J-102	RESISTOR
R60	QRD161J-102	RESISTOR
R61	QRD161J-102	RESISTOR
R62	QRD161J-102	RESISTOR
R63	QRD161J-102	RESISTOR
R64	QRD161J-102	RESISTOR
R65	QRD161J-103	RESISTOR
R67	QRD161J-102	RESISTOR
R69	QRD161J-103	RESISTOR
R101	QRD161J-271	RESISTOR
R102	QRD161J-102	RESISTOR
R103	QRD161J-392	RESISTOR
R104	QRD161J-392	RESISTOR
R105	QRD161J-100	RESISTOR
R106	QRD161J-100	RESISTOR
R107	QRD161J-122	RESISTOR
R108	QRD161J-122	RESISTOR
R109	QRD161J-123	RESISTOR
R110	QRD161J-123	RESISTOR
R111	QRD161J-681	RESISTOR
R112	QRD161J-102	RESISTOR
R113	QRD161J-473	RESISTOR
R114	QRD161J-272	RESISTOR
R115	QRD161J-153	RESISTOR
R116	QRD161J-471	RESISTOR
R117	QRD161J-224	RESISTOR
R118	QRD161J-223	RESISTOR
R119	QRD161J-681	RESISTOR
R120	QRD161J-473	RESISTOR
R121	QRD161J-152	RESISTOR
R122	QRD161J-223	RESISTOR
R123	QRD161J-561	RESISTOR
R124	QRD161J-821	RESISTOR
R125	QRD161J-102	RESISTOR

REF NO.	PART NO.	PART NAME, DESCRIPTION
R126	QRD161J-102	RESISTOR
R131	QRD161J-102	RESISTOR
R132	QRD161J-100	RESISTOR
R133	QRD161J-152	RESISTOR
R134	QRD161J-332	RESISTOR
R135	QRD161J-332	RESISTOR
R136	QRD161J-472	RESISTOR
R137	QRD161J-100	RESISTOR
R138	QRD161J-152	RESISTOR
R139	QRD161J-104	RESISTOR
R140	QRD161J-104	RESISTOR
R141	QRD161J-102	RESISTOR
R142	QRD161J-102	RESISTOR
R143	QRD161J-392	RESISTOR
R144	QRD161J-102	RESISTOR
R145	QRD161J-102	RESISTOR
R146	QRD161J-104	RESISTOR
R147	QRD161J-104	RESISTOR
R148	QRD161J-104	RESISTOR
R149	QRD161J-104	RESISTOR
R150	QRD161J-221	RESISTOR
R151	QRD161J-221	RESISTOR
R152	QV23513-472	V R,R-CH FM REC LEV
R153	QV23513-472	V R,L-CH FM REC LEV
R154	QRD161J-103	RESISTOR
R155	QRD161J-103	RESISTOR
R156	QRD161J-223	RESISTOR
R157	QRD161J-223	RESISTOR
R158	QRD161J-102	RESISTOR
R159	QRD161J-223	RESISTOR
R160	QRD161J-223	RESISTOR
R161	QRD161J-102	RESISTOR
RA2	EXB-PB8103M	NETWORK RESISTOR
C3	QCF31HP-102	CAPACITOR
C6	QEN61HM-105	NP E CAPACITOR
C7	QFN31HJ-472	M CAPACITOR
C8	QETC1EM-475	E CAPACITOR
C9	QETC1EM-475	E CAPACITOR
C10	QETC1CM-106	E CAPACITOR
C11	QETC1CM-106	E CAPACITOR
C12	QEN61HM-105	NP E CAPACITOR
C13	QFV71HJ-104	CAPACITOR
C14	QCS31HJ-101	CAPACITOR
C15	QFN31HJ-822	M CAPACITOR
C16	QFV71HJ-683	M CAPACITOR
C17	QCF31HP-102	CAPACITOR
C18	QETC1AM-226	E CAPACITOR
C19	QCS31HJ-101	CAPACITOR
C20	QCS31HJ-100	CAPACITOR
C21	QETC1HM-105	E CAPACITOR
C22	QETC1HM-475	E CAPACITOR
C23	QETC1AM-226	E CAPACITOR
C24	QCS31HJ-221	CAPACITOR
C25	QETC1HM-105	E CAPACITOR
C26	QCF31HP-223	CAPACITOR
C27	QETC1AM-476	E CAPACITOR
C28	QCS31HJ-470	CAPACITOR
C29	QCS31HJ-470	CAPACITOR
C30	QCS31HJ-101	CAPACITOR
C31	QETC1AM-476	E CAPACITOR
C32	QCF31HP-223	CAPACITOR
C33	QFN31HJ-223	M CAPACITOR
C34	QETC1CM-106	E CAPACITOR
C35	QETC1AM-476	E CAPACITOR
C36	QCF31HP-223	CAPACITOR

REF NO.	PART NO.	PART NAME, DESCRIPTION
C37	QETC1AM-476	E CAPACITOR
C38	QCF31HP-103	CAPACITOR
C41	QETC1CM-476	E CAPACITOR
C42	QETC1CM-476	E CAPACITOR
C44	QCF31HP-102	E CAPACITOR
C45	QETC1CM-476	E CAPACITOR
C47	QCF31HP-103	CAPACITOR
C101	QETC1AM-476	E CAPACITOR
C102	QCF31HP-223	CAPACITOR
C103	QCF31HP-473	CAPACITOR
C104	QCF31HP-103	CAPACITOR
C105	QCF31HP-103	CAPACITOR
C106	QCF31HP-103	CAPACITOR
C107	QCS31HJ-221	CAPACITOR
C108	QCS31HJ-221	CAPACITOR
C109	QCF31HP-223	CAPACITOR
C110	QCF31HP-223	CAPACITOR
C111	QETC1HM-105	E CAPACITOR
C112	QETC1HM-105	E CAPACITOR
C113	QCS31HJ-331	CAPACITOR
C114	QCS31HJ-390	CAPACITOR
C115	QCF31HP-103	CAPACITOR
C116	QCF31HP-223	CAPACITOR
C117	QETC1HM-224	E CAPACITOR
C118	QCF31HP-223	CAPACITOR
C119	QETC1CM-476	E CAPACITOR
C120	QCF31HP-223	CAPACITOR
C121	QCF31HP-223	CAPACITOR
C122	QETC1HM-476	E CAPACITOR
C123	QCF31HP-223	CAPACITOR
C125	QCF31HP-222	CAPACITOR
C126	QETC1CM-476	E CAPACITOR
C127	QCF31HP-223	CAPACITOR
C128	QCF31HP-103	CAPACITOR
C129	QCF31HP-103	CAPACITOR
C130	QCF31HP-103	CAPACITOR
C131	QCF31HP-103	CAPACITOR
C132	QCF31HP-103	CAPACITOR
C133	QCF31HP-103	CAPACITOR
C134	QCF31HP-103	CAPACITOR
C135	QCF31HP-102	CAPACITOR
C136	QCF31HP-102	CAPACITOR
L3	PU48530-150J	COIL
L4	PU48530-221J	COIL
L5	PU48530-221J	COIL
L101	PU53223-101J	COIL, X3(L101-103)
L104	PU53223-221J	COIL
L105	PU53223-221J	COIL
BPF103	PU56177-3	BAND PASS FILTER
X1	PG200186	CRYSTAL RESONATOR
T101	PU56175	S. TRANS
T102	PU56175	S. TRANS
H01	PU51212	FUSE CLIP, X6
HD2	PG200605-07	PWB SPACER, X2
HD3	PG200606-07	PWB HOLDER, X2
SLD101	PGD40137	SHIELD CASE(1)
SLD102	PGD40138	SHIELD CASE(2)
SLD103	PGD40139-01-01	SHIELD CASE(3)
TP1	PU54983	TEST PIN, X8(TP1-8)
TP101	PU54983	TEST PIN, X10(TP101-110)

REF NO.	PART NO.	PART NAME, DESCRIPTION
CN1	PU58844-5	CAP HOUSING
CN2	PU58844-2	CAP HOUSING
CN3	PU58844-6	CAP HOUSING
CN4	PU58844-10	CAP HOUSING
CN5	PU58844-3	CAP HOUSING
CN6	PU58844-4	CAP HOUSING
CN7	PU58844-3	CAP HOUSING
CN8	PU58844-7	CAP HOUSING
CN9	PU59934-17	WIRE HOLDER
CN10	PU58844-5	CAP HOUSING
CN11	PU58844-4	CAP HOUSING
CN12	PU58844-9	CAP HOUSING
CN13	PU58844-4	CAP HOUSING
CN14	PU58844-2Y	CAP HOUSING
CN15	PU58844-7	CAP HOUSING
CN101	PU58844-4	CAP HOUSING, X2(CN101,104)
CN102	PU58844-3	CAP HOUSING
CN103	PU58844-2	CAP HOUSING, X2(CN103,105)
CP101	ICP-F10	CIRCUIT PROTECTOR
CP102	ICP-F10	CIRCUIT PROTECTOR
*****		
16. MOTHER BOARD ASSEMBLY <07>		
*****		
PWBA	PGE10112B-02	MOTHER BOARD ASSY
R1	QRD167J-181	RESISTOR
R2	QRD167J-181	RESISTOR
BKT1	PRD42517	MOTHER BOARD BRACKET
CL1	PU54969	WIRE CLAMP, X2
CL2	PU59311-3	WIRE CLAMP, X3
CL3	PU59311-2	WIRE CLAMP
CL4	PU59311-4	WIRE CLAMP
SCW1	GBST3006Z	TAPPING SCREW, X2
SPC1	PU43172-9-015	NYLON GROMMET, X4
SPC2	PG201128	SPACER, X2
CN1	PU58844-7	CAP HOUSING
CN2	PU58844-6	CAP HOUSING
CN3	PU58844-7	CAP HOUSING
CN4	PU58844-6	CAP HOUSING
CN5	PU58844-7	CAP HOUSING
CN6	PU58844-6	CAP HOUSING
CN7	PU58844-8	CAP HOUSING
CN8	PU58844-4	CAP HOUSING
CN9	PU58844-4R	CAP HOUSING
CN10	PU58844-4Y	CAP HOUSING
CN11	PU58844-3R	CAP HOUSING
CN12	PU58844-6	CAP HOUSING
CN13	PU58844-8	CAP HOUSING
CN14	PU58844-4	CAP HOUSING
CN15	PU58844-3R	CAP HOUSING
CN16	PU58844-8	CAP HOUSING
CN17	PU58844-7	CAP HOUSING
CN18	PU58844-3	CAP HOUSING
CN19	PU58844-3	CAP HOUSING
CN20	PU58844-3	CAP HOUSING
CN21	PU58844-4	CAP HOUSING
CN22	PU58844-4R	CAP HOUSING
CN23	PU58844-4	CAP HOUSING

#	REF NO.	PART NO.	PART NAME, DESCRIPTION
CN24	PUS8844-4	CAP HOUSING	
CN25	PUS8844-4R	CAP HOUSING	
CN26	PUS8844-4	CAP HOUSING	
CN27	PUS8844-4R	CAP HOUSING	
CN28	PUS8844-4	CAP HOUSING	
CN29	PUS8844-4Y	CAP HOUSING	
CN30	PUS8844-3	CAP HOUSING	
CN31	PUS8844-4R	CAP HOUSING	
CN32	PUS8844-4	CAP HOUSING	
CN33	PUS8844-4	CAP HOUSING	
CN34	PUS8844-4Y	CAP HOUSING	
CN35	PUS8844-3	CAP HOUSING	
CN36	PUS8844-2	CAP HOUSING	
CN37	PUS8844-4	CAP HOUSING	
CN38	PUS8844-4Y	CAP HOUSING	
CN39	PUS8844-2	CAP HOUSING	
CN40	PUS8844-4Y	CAP HOUSING	
CN41	PUS8844-2	CAP HOUSING	
CN42	PUS8844-2	CAP HOUSING	
CN43	PUS8844-2	CAP HOUSING	
CN44	PUS8844-3R	CAP HOUSING	
CN45	PUS8844-3R	CAP HOUSING	
CN46	PUS8844-3R	CAP HOUSING	
CN47	PUS8844-6	CAP HOUSING	
CN48	PUS8844-3Y	CAP HOUSING	
CN49	PUS8844-3Y	CAP HOUSING	
CN50	PUS8844-3Y	CAP HOUSING	
CN51	PUS8844-4Y	CAP HOUSING	
CN52	PUS8844-3Y	CAP HOUSING	
CN53	PUS8844-5	CAP HOUSING	
CN54	PUS8844-3	CAP HOUSING	
CN55	PUS8844-2	CAP HOUSING	
CN56	PUS8844-2R	CAP HOUSING	
CN57	PUS8844-2Y	CAP HOUSING	
CN60	PUS8844-2	CAP HOUSING	
CN61	PUS8844-2	CAP HOUSING	
CN62	PUS8844-2	CAP HOUSING	
CN65	PUS8844-3	CAP HOUSING	
CN66	PUS8844-8	CAP HOUSING	
CN67	PUS8844-8	CAP HOUSING	
CN101	PGZ00420-64	FEMALE CONNECTOR	
CN102	PGZ00420-64	FEMALE CONNECTOR	
CN103	PGZ00420-64	FEMALE CONNECTOR	
CN105	PGZ00420-64	FEMALE CONNECTOR	
*****			
M 17. REAR-2 BOARD ASSEMBLY <08>			
*****			
PWBA	PGE20269A-01	REAR-2 BOARD ASSY	
IC1	MS1490L	IC	
IC2	MS1490L	IC	
IC3	TC4071BP	IC	
IC4	TC4053BP	IC	
IC5	TC4049BP	IC	
IC6	TC4049BP	IC	
IC7	TA78L005AP	IC	
IC8	TC4013BP	IC	
Q1	DTC143TF	TRANSISTOR	
Q2	DTC143TF	TRANSISTOR	
Q3	2SD973AR	TRANSISTOR	
D1	1SS133	DIODE	

#	REF NO.	PART NO.	PART NAME, DESCRIPTION
D2	1SS133	DIODE	
D3	1SS133	DIODE	
D4	1SS133	DIODE	
D5	1SS133	DIODE	
D6	1SS133	DIODE	
D7	RD4.7EB1	ZENER DIODE	
D8	RD6.2EB1	ZENER DIODE	
R1	QRD167J-152	RESISTOR	
R2	QRD167J-224	RESISTOR	
R3	QRD167J-390	RESISTOR	
R4	QRD167J-390	RESISTOR	
R5	QRD167J-222	RESISTOR	
R6	QRD167J-104	RESISTOR	
R7	QRD167J-152	RESISTOR	
R8	QRD167J-224	RESISTOR	
R9	QRD167J-103	RESISTOR	
R10	QRD167J-103	RESISTOR	
R11	QRD167J-102	RESISTOR	
R12	QRD167J-102	RESISTOR	
R13	QRD167J-682	RESISTOR	
R14	QRD167J-682	RESISTOR	
R15	QRD167J-102	RESISTOR	
R16	QRD167J-102	RESISTOR	
R17	QRD167J-102	RESISTOR	
R21	QRD167J-122	RESISTOR	
R22	QRD167J-391	RESISTOR	
R23	QRD167J-102	RESISTOR	
R25	QRD167J-473	RESISTOR	
R26	QRD167J-473	RESISTOR	
R27	QRD167J-103	RESISTOR	
R28	QRD167J-103	RESISTOR	
R29	QRD167J-103	RESISTOR	
R30	QRD167J-102	RESISTOR	
R31	QRD167J-151	RESISTOR	
C1	QETC1CM-476	E CAPACITOR	
C2	QFN31HK-103	M CAPACITOR	
C3	QFV41HJ-474	TF CAPACITOR	
C4	QETC1CM-476	E CAPACITOR	
C5	QETC1CM-476	E CAPACITOR	
C6	QFV41HJ-474	TF CAPACITOR	
C7	QFN31HK-103	M CAPACITOR	
C8	QETC1HM-105	E CAPACITOR	
C9	QETC1HM-105	E CAPACITOR	
C10	QETC1HM-105	E CAPACITOR	
C11	QETC1HM-105	E CAPACITOR	
C14	QETC1HM-105	E CAPACITOR	
C15	QETC1HM-474	E CAPACITOR	
C16	QCF31HP-103	CAPACITOR	
C17	QCF31HP-103	CAPACITOR	
C18	QCF31HP-103	CAPACITOR	
C20	QFN31HJ-222	M CAPACITOR	
S1	PGZ00470	SLIDE SWITCH,NOR PB OUT	
TP1	PUS4983	TEST PIN, X6(TP1-6)	
CN1	PUS8844-2	CAP HOUSING	
CN2	PUS8844-2R	CAP HOUSING	
CN3	PUS8844-2Y	CAP HOUSING	
CN4	PUS8844-2	CAP HOUSING	
CN5	PUS8844-2R	CAP HOUSING	
CN6	PUS8844-2Y	CAP HOUSING	
CN7	PUS8844-2	CAP HOUSING	
CN8	PUS8844-2R	CAP HOUSING	
CN9	PUS8844-2Y	CAP HOUSING	
CN10	PUS8844-4	CAP HOUSING	
CN11	PUS8844-4R	CAP HOUSING	

#	REF NO.	PART NO.	PART NAME, DESCRIPTION
CN12	PUS8844-4Y	CAP HOUSING	
CN13	PUS8844-4	CAP HOUSING	
CN14	PUS8844-4R	CAP HOUSING	
CN15	PUS8844-4Y	CAP HOUSING	
CN16	PUS8844-4	CAP HOUSING	
CN17	PUS8844-4	CAP HOUSING	
CN18	PUS8844-6	CAP HOUSING	
CN19	PUS8844-6	CAP HOUSING	
CN20	PUS8844-4	CAP HOUSING	
CN21	PUS8844-9	CAP HOUSING	
CN22	PUS8844-6	CAP HOUSING	
CN23	PUS8844-5	CAP HOUSING	
CN24	PUS8844-2	CAP HOUSING	
CN25	PUS8844-2R	CAP HOUSING	
CN26	PUS8844-2Y	CAP HOUSING	
CN27	PUS8844-2	CAP HOUSING	
*****			
M 18. FRONT-1 BOARD ASSEMBLY <09>			
*****			
PWBA	PGE30173A-01	FRONT-1 BOARD ASSY	
-FRONT VR & SWITCH BOARD ASSEMBLY <09>-			
R1	PGZ00466	V RESISTOR,HIFI L	
R2	PGZ00466	V RESISTOR,HIFI R	
R3	PGZ00466	V RESISTOR,NOR L	
R4	PGZ00466	V RESISTOR,NOR R	
S1	PGZ01109	SLIDE SWITCH,METER SEL	
-DISPLAY BOARD ASSEMBLY <10>-			
D1	TLR353	LE DIODE,WARN CODE	
D2	GL-9PR2	LE DIODE,WARN A	
D3	GL-9PR2	LE DIODE,WARN B	
D4	GL-9PR2	LE DIODE,WARN C	
D5	GL-9NG2	LE DIODE,NR	
D6	GL-9NG2	LE DIODE,AGC	
D7	GL-9NG2	LE DIODE,HIFI	
D8	GL-9NG2	LE DIODE,LIMITER	
R1	QRD167J-471	RESISTOR	
R2	QRD167J-471	RESISTOR	
R3	QRD167J-471	RESISTOR	
R4	QRD167J-471	RESISTOR	
R5	QRD167J-471	RESISTOR	
R6	QRD167J-471	RESISTOR	
R7	QRD167J-471	RESISTOR	
R8	QRD167J-471	RESISTOR	
R9	QRD167J-471	RESISTOR	
R10	QRD167J-471	RESISTOR	
R11	QRD167J-331	RESISTOR	
R12	QRD167J-331	RESISTOR	
R13	QRD167J-331	RESISTOR	
R14	QRD167J-331	RESISTOR	
*****			
M 19. FRONT-2 BOARD ASSEMBLY <11>			
*****			
PWBA	PGE20241A-01	FRONT-2 BOARD ASSY	
-TERMINAL BOARD ASSEMBLY <11>-			
R1	QRD161J-103	RESISTOR	
R2	QRD161J-102	RESISTOR	

#	REF NO.	PART NO.	PART NAME, DESCRIPTION
R4	QRD161J-105	RESISTOR	
C1	QETA1HM-105	CAPACITOR	
S1	PGZ01111	SLIDE SWITCH,TER SEL	
TML1	PGZ00472	TERMINAL,SERVICE POINT	
-REMOTE JACK BOARD ASSEMBLY <12>-			
J1	PU47500	MINI JACK,REMOTE	
Δ VA1	PU49624-2	VARISTOR	
*****			
M 20. REAR-1 BOARD ASSEMBLY <13>			
*****			
PWBA	PGE20235C-04	REAR-1 BOARD ASSY	
IC101	MS218P	IC	
IC102	MS218P	IC	
R1	QRD167J-750	RESISTOR	
R101	QRD167J-273	RESISTOR	
R102	QRD167J-822	RESISTOR	
R103	QRD167J-273	RESISTOR	
R104	QRD167J-822	RESISTOR	
R105	QRD167J-273	RESISTOR	
R106	QRD167J-822	RESISTOR	
R107	QRD167J-273	RESISTOR	
R108	QRD167J-822	RESISTOR	
R109	QRD167J-273	RESISTOR	
R110	QRD167J-273	RESISTOR	
R111	QRD167J-822	RESISTOR	
R112	QRD167J-273	RESISTOR	
R113	QRD167J-822	RESISTOR	
R114	QRD167J-273	RESISTOR	
R115	QRD167J-822	RESISTOR	
R116	QRD167J-273	RESISTOR	
R117	QRD167J-822	RESISTOR	
R118	QRD167J-273	RESISTOR	
C8	QCF11HP-102	CAPACITOR	
C9	QCF11HP-102	CAPACITOR	
C10	QCF11HP-473	CAPACITOR	
C11	QCF11HP-473	CAPACITOR	
C101	QCS31HJ-7R0	CAPACITOR	
C102	QCS31HJ-6R0	CAPACITOR	
C103	QEP1EM-475	NP E CAPACITOR	
C104	QER61AM-476	E CAPACITOR	
C105	QER61AM-476	E CAPACITOR	
C106	QEP1EM-475	NP E CAPACITOR	
C107	QER61CM-476	E CAPACITOR	
C108	QCS31HJ-7R0	CAPACITOR	
C109	QCS31HJ-6R0	CAPACITOR	
C110	QEP1EM-475	NP E CAPACITOR	
C111	QER61AM-476	E CAPACITOR	
C112	QER61AM-476	E CAPACITOR	
C113	QEP1EM-475	NP E CAPACITOR	
C114	QER61CM-476	E CAPACITOR	
C115	QER61CM-476	E CAPACITOR	
C116	QER61CM-476	E CAPACITOR	
L1	PU48530-100J	COIL	
L2	PU48530-100J	COIL	

&lt;13&gt;&lt;14&gt;&lt;15&gt;&lt;16&gt;&lt;18&gt;

REF NO.	PART NO.	PART NAME, DESCRIPTION
S2	PG200469-02	SLIDE SWITCH, SYNC SEL
S3	PG200470-02	SLIDE SWITCH, EXT CODE
S4	PG200469-02	SLIDE SWITCH, AUD IN SEL
J2	PG200221-2	2P JACK ASSY, NOR IN
J3	PG200221-2	2P JACK ASSY, SERIAL CODE
J5	PG200414	1P JACK ASSY, EXT CODE
J6	PG200414	1P JACK ASSY, WARN CODE
J7	PG200511-02	CONNECTOR ASSY, VIDEO IN
VA1	PU49624-2	VARISTOR, X5(VA1-5)
CN1	PUS8844-104	CAP HOUSING
CN2	PUS8844-103	CAP HOUSING
CN4	PUS8844-102	CAP HOUSING
CN5	PUS8844-106	CAP HOUSING
CN6	PUS8844-104	CAP HOUSING
CN7	PUS8844-104	CAP HOUSING
CN8	PUS8844-102	CAP HOUSING
CN101	PUS8844-103	CAP HOUSING
CN102	PUS8844-103	CAP HOUSING
*****		
* 21. POWER BOARD ASSEMBLY <14> *		
*****		
PWBA	PGE20237C-01	POWER BOARD ASSY
IC1	STR2012A	IC
IC2	STR2012A	IC
IC3	STR2012A	IC
IC4	TA78005AP	IC
DA1	RBV601	DIODE
DA2	RBV601	DIODE
R1	QRD167J-391	RESISTOR
C1	QFH52AM-224	MM CAPACITOR
C2	QEL71VR-478	E CAPACITOR
C3	QETA1VM-477	E CAPACITOR
C4	QETA1CM-477	E CAPACITOR
C5	QCF11HP-223	CAPACITOR
C6	QETA1VM-477	E CAPACITOR
C7	QETA1CM-477	E CAPACITOR
C8	QCF11HP-223	CAPACITOR
C9	QETA1VM-477	E CAPACITOR
C10	QETA1AM-108	E CAPACITOR
C11	QCF11HP-223	CAPACITOR
C12	QFH52AM-224	MM CAPACITOR
C13	QEL71VR-478	E CAPACITOR
C16	QETA1CM-227	E CAPACITOR
C17	QCF11HP-223	CAPACITOR
C18	QETA1CM-227	E CAPACITOR
C19	QCF11HP-223	CAPACITOR
C20	QETA1CM-477	E CAPACITOR
C21	QETA0JM-107	E CAPACITOR
C22	QCF11HP-223	CAPACITOR
C101	QC29016-102A	CAPACITOR
C102	QC29016-102A	CAPACITOR
C103	QC29016-102A	CAPACITOR
L1	PG200253-241	COIL
L2	PG200253-241	COIL
L3	PG200253-241	COIL
BKT1	PRD42518-01-01	PWB BRACKET
H01	PU51212	FUSE CLIP, X10
HS1	PGD40116	HEAT SINK, (IC1,3)
HS2	PGD40223A	HEAT SINK, IC2
HS3	PGD40694	HEAT SINK, IC4
HS4	PGD40489	HEAT SINK, DA1
HS5	PRD42587	HEAT SINK, DA2

REF NO.	PART NO.	PART NAME, DESCRIPTION
SCW1	SPSP30102	SCREW, X9(IC1-4,DA1,2)
SCW2	GBST3008Z	SCREW, X2(HEAT SINK)
SCW3	GBST3008Z	SCREW, X2
SPC1	PG200151	TR SPACER, X3(IC1-3)
SPC2	PG200150	TR SPACER, IC4
SPC3	PU41624-6	ISOLAT.WASHER, IC4
TP1	PU54983	TEST PIN, X7(TP1-7)
CN1	PU43351-7	CAP HOUSING
CN2	PU43351-5	CAP HOUSING
CN3	PU43351-6	CAP HOUSING
CN4	PU43351-2	CAP HOUSING
CN5	PU43351-2R	CAP HOUSING
*****		
* 22. SELECT SWITCH BOARD ASSEMBLY <15> *		
*****		
PWBA	PGE30170A	SELECT SWITCH BOARD ASSY
S1	PG200469-02	SLIDE SWITCH,NR
S2	PG200470-02	SLIDE SWITCH,HIFI REC
S3	PG200469-02	SLIDE SWITCH,AGC
S4	PG200469-02	SLIDE SWITCH,LIMITER
S5	PG200469-02	SLIDE SWITCH,VIDEO SEL
CN1	PUS8844-104Y	CAP HOUSING
CN2	PUS8844-103R	CAP HOUSING
CN3	PUS8844-104	CAP HOUSING
CN4	PUS8844-103	CAP HOUSING
*****		
* 23. HOUR METER & LED BOARD ASSEMBLY <16> *		
*****		
PWBA	PGE40254A-01	METER/LED BOARD ASSY
Q1	DTCL44EF	TRANSISTOR
D1	LT952605	LE DIODE
R1	QRD167J-275	RESISTOR
R2	QRD167J-392	RESISTOR
R3	QRD167J-474	RESISTOR
R4	QRD167J-471	RESISTOR
R5	QRD167J-471	RESISTOR
S1	QSS1N22-L01	SLIDE SWITCH
H01	PU44398	FUSE SOCKET, X2
*****		
* 24. SWITCH & LED BOARD ASSEMBLY <18> *		
*****		
PWBA	PGE40266A	SWITCH/LED BOARD ASSY
D1	GL-9MG2	LE DIODE, TAPE RUN
R1	QRD167J-331	RESISTOR
S1	PG201112	PUSH SWITCH, EJECT

&lt;18&gt;&lt;20&gt;&lt;21&gt;&lt;22&gt;&lt;23&gt;&lt;24&gt;&lt;31&gt;&lt;35&gt;&lt;41&gt;

REF NO.	PART NO.	PART NAME, DESCRIPTION
SPC1	PU50633	LED SPACER (A)
CN1	PUS8844-104	CAP HOUSING
*****		
* 25. REEL MDA BOARD ASSEMBLY <20> *		
*****		
PWBA	PGE40264A	REEL MDA BOARD ASSY
IC1	M54644BL	IC
C1	QETC1CM-476	E CAPACITOR
*****		
* 26. DECK TERMINAL BOARD ASSEMBLY <21> *		
*****		
PWBA	PU22509E1	DECK TERMINAL BOARD ASSY
R1	QRD182J-151	RESISTOR
R3	QRD182J-331	RESISTOR
PS1	PU60271	PHOTO INTERRUPTER
CN1	PU59933-17	WIRE TRAP, (1-17)
*****		
* 27. RELAY BOARD ASSEMBLY <22> *		
*****		
PWBA	PU22509E2-01	RELAY BOARD ASSY
LC1	PU59809-222T	N FILTER
LC2	PU59809-222T	N FILTER
WR1	PW30113-G0ABZ62	PARALLEL WIRE, (1,2)
	OR PW30118-G0ABZ62	PARALLEL WIRE, (1,2)
*****		
* 28. REC SAFETY BOARD ASSEMBLY <23> *		
*****		
PWBA	PU22509E3	REC SAFETY BOARD ASSY
S1	PUS8844-1-3	REC SAFETY SWITCH
*****		
* 29. END SENSOR BOARD ASSEMBLY <24> *		
*****		
PWBA	PU22509E4	END SENSOR BOARD ASSY
Q1	PN268R-NC	PHOTO TRANSISTOR

REF NO.	PART NO.	PART NAME, DESCRIPTION
H01	PQ31047-1-4	END SENSOR HOLDER
CN1	PUS9945-102	WIRE SOCKET
*****		
* 30. REAR SUB BOARD ASSEMBLY <31> *		
*****		
PWBA	PGE300918	REAR SUB BOARD ASSY
R1	QRD161J-101	RESISTOR
R2	QRD161J-101	RESISTOR
R3	QRD161J-101	RESISTOR
R4	QRD161J-101	RESISTOR
R5	QRD161J-101	RESISTOR
R6	QRD161J-101	RESISTOR
R7	QRD161J-101	RESISTOR
R8	QRD161J-101	RESISTOR
R9	QRD161J-101	RESISTOR
R10	QRD161J-101	RESISTOR
R11	QRD161J-101	RESISTOR
R12	QRD161J-101	RESISTOR
R13	QRD161J-101	RESISTOR
C1	QETA1CM-227	E CAPACITOR
VA1	PU49624-2	VARISTOR
VA2	PU49624-2	VARISTOR
VA3	PU49624-2	VARISTOR
VA4	PU49624-2	VARISTOR
VA5	PU49624-2	VARISTOR
VA6	PU49624-2	VARISTOR
VA7	PU49624-2	VARISTOR
VA8	PU49624-2	VARISTOR
VA9	PU49624-2	VARISTOR
VA10	PU49624-2	VARISTOR
VA11	PU49624-2	VARISTOR
VA12	PU49624-2	VARISTOR
VA13	PU49624-2	VARISTOR
VA14	PU49624-2	VARISTOR
VA15	PU49624-2	VARISTOR
*****		
* 31. A/CTL HEAD BOARD ASSEMBLY <35> *		
*****		
PWBA	PGE40088	A/C HEAD BOARD ASSY
R1	QRD167J-100	RESISTOR
R2	QRD167J-100	RESISTOR
CN1	PU49215-104	CAP HOUSING
*****		
* 32. POWER TRANSISTOR BOARD ASSEMBLY <41> *		
*****		
PWBA	PGE40034	POWER TRANSISTOR BOARD ASSY

